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PRIZE ESSAY

ON THE STATE OF

SOCIETY AND KNOWLEDGE

IN THE

HIGHLANDS OF SCOTLAND,

PARTICULARLY

IN THE NORTHERN COUNTIES,

AT THE

PERIOD OF THE REBELLION IN 1745,

AND OF

THEIR PROGRESS UP TO THE ESTABLISHMENT OF THE NORTHERN INSTITUTION FOR THE PROMOTION OF SCIENCE AND LITERATURE, IN 1825.

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BY JOHN ANDERSON,

WRITER TO THE SIGNET, SECRETARY TO THE SOCIETY OF SCOTTISH ANTIQUARIES.

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INTRODUCTION.

THE NORTHERN INSTITUTION was established at Inverness in the month of March 1825, for the promotion of Science and Literature in general, and more particularly with the view of investigating the Antiquities, and Civil and Natural History of the Highlands and Islands of Scotland.

To aid the researches of the members, and to afford to Society at large, throughout the northern districts of the country, facilities for study which did not previously exist, a Museum has been opened by the Institution, for the collection and preservation of objects of Natural History,

Antiquities, and Works of Art, as well as a Library for scarce and valuable Books and Manuscripts.

The central situation and importance of Inverness, and the connexion which subsists between its inhabitants and those of various parts of the united kingdom and the colonies, pointed it out as the most suitable place in which to commence the establishment. From the encouragement which it has received,—exceeding the most sanguine expectations of those with whom the measure originated,—they have the satisfaction of believing that their anticipations of the benefits likely to result from it, and of the feelings with which it would be regarded by their countrymen,—were well founded. As it is hoped that all interested in the advancement of knowledge, and the improvement of the Highlands, will now be disposed to give their support to the Institution, a list of its members, with a short notice of its proceedings, and of the donations already received, are subjoined in the Appendix to this volume, from an examination of which, its character and respectability, and the extent of the Museum, may be justly appreciated.

Circular Letters have been distributed over the country, explaining the intentions of the Society, and enumerating a long series of topics connected with the Natural History and Antiquities of the Highlands and Isles, regarding which correct information was yet awanting. An Address, framed for the purpose of soliciting contributions from abroad, accompanied by an account of the Society's transactions, has also been printed, and is now on its way to all parts of the world. The addresses of several Clergymen, and mercantile Gentlemen, who will receive and transmit communications and donations intended for the Institution, are likewise inserted in the Appendix.

At the first General Meeting held on the 23d of March 1825, Sir George Steuart Mackenzie, of Coul, Bart. offered for competition among the members, a Gold Medal of the value of *L.10*, for the best account of the State of Society and of Knowledge in the Highlands of Scotland, particularly in the Northern Counties at the period of the Rebellion in the year 1745, and of their progress up to the Establishment of the Institution. The

Essay now published is the one to which the Prize has been awarded; and on presenting it to the successful Author, at the Anniversary Meeting, on the 27th October 1826, Sir George delivered the following

ADDRESS:

"GENTLEMEN,

"WHOEVER looks back on the dark ages, and traces the progress of learning from its dawning upon Europe, until it reached its meridian effulgence in the present age, will find that the institution of literary and scientific societies mainly contributed to the brilliant illumination of the human mind, which now sheds its radiance equally over the palace and the cottage. By means of such societies, an impulse was given to experimental science, from which the most important distinctions have arisen; and men are now more desirous to have their names enrolled among those who have contributed to the

sum of human knowledge and happiness, than among the heroes of the battle and the conquest.

"Without in the least detracting from the great services rendered to mankind by similar institutions in other parts of Europe, the establishment of the Royal Society of London may be reckoned among the most important events in the history of science. Much as the early supporters of that institution were ridiculed, and railed at by ignorant superstition, the edifice they began to rear was laid on a foundation fixed in the understandings of gifted and enlightened men, so as not to be moved by such puny, but too often effective assailants. The human mind had begun to discover means to loosen the fetters by which it had been degraded, and of soaring towards its proper sphere. Before the establishment of the London Society, classical learning, mathematical science, and the fine arts, were in a flourishing condition. But they were so far out of reach, that only a few shared in the riches of the inexhaustible mines. We do not find that, before the institution of the Royal Society, the physical sciences, and especially their application to the arts and comforts of life,

had gained a single step in Great Britain, nor anywhere else previous to associations of learned men having been formed. Every thing seemed to have adopted a regular, settled pace, beyond the rate of which no effort to move seemed possible. To be as wise as their fathers, was all that men aimed at. It is not therefore surprising that, during such a state of immobility, the most absurd philosophy should have become paramount to truth; and that it was considered almost impious to challenge the dogmas of the schools. No sooner, however, was the challenge sounded, than distinction was sought in the attack and defence of long-cherished systems. By degrees literature and philosophy stole from their concealment, and introduced themselves into private society; a spirit of inquiry was excited; new objects of pursuit were found for the mental powers; and every branch of knowledge was occupied by aspirants to the fame of discovery.

"The first association in Scotland for the advancement of knowledge, was the Philosophical Society instituted in Edinburgh about fifty years ago. About the year 1780, the Society of Scottish Antiquaries was established by royal charter. Three

years afterwards the Royal Society of Edinburgh was incorporated also by royal charter, the original members being those of the Philosophical Society. Although Scotland was then distinguished for metaphysical acumen, and by the plodding activity of her sons, she had not yet imbibed that desire for discovery which obtained in the sister kingdom. The great impulse has been given to the exertion of talent within the last thirty years, during which period we have seen literary and scientific establishments rising up everywhere; and at length one has, I trust, taken firm root in the Northern Capital. The literary man and the philosopher are no longer considered as useless members of society; they are everywhere looked up to as the pioneers to comfort, happiness, and wealth; as the benefactors of their country.

"One great feature in the revolution that has of late taken place in science is, that theory is now little attended to, except as a guide, and a stimulus to research. No theory is relied upon; every mind proceeds to investigate its foundation, and to prove the stability of the superstructure; and nothing will satisfy but the discovery of facts, and the results of experiment.

The consequence of this agitation and excitement of mental energy is, that talents of the first order will no longer be wasted in undermining old systems, in order out of the materials to build up others equally, if not more, absurd. Our senses and our reason have taken place of imagination. This important revolution is to be attributed exclusively to the energy that has been infused into our learned societies. To be admitted into them, it is not now required that a man should be a universal genius, or that he should have given some signal proof of transcendent ability in some department or other. It has become of importance to encourage mere observation. Observers communicate facts to those who can speculate upon them, and ascertain their importance. Then all classes are brought together; every one communicating his acquirements, however small they may be; every one can add, as we say in the north, a stone to the cairn; and thus the mass of knowledge, as well as the number of those capable of making use of it, is continually and every moment increasing in extent and variety of materials. Each mind has now a field properly suited to the range of its own special powers.

Timidity is banished; the faculties expand themselves; and the empire of liberty, founded on the basis of knowledge and truth, is spreading with incalculable rapidity. Selfishness disappears; and though some generations must pass, before such a consummation can take place, the time certainly approaches when the chief aim of individuals will be to promote general happiness. Many prejudices remain to be overcome; but it is not likely that the progress of discovery, physical and mental, will be retarded. The prospect is cheering, as it is honourable to human nature.

"Philosophers have been often accused of aiming at the subversion of religion; and metaphysicians have openly attempted it. But truth, discovered by the sure tests of inductive science, can never affect true religion, natural or revealed, otherwise than to confirm it. Pure and undefiled Christianity will stand pre-eminent to the end of time; true philosophy unfolding its beauties, and conducting us to its divine origin. The reign of priestcraft over the mind is almost at an end in our happy land, and it must soon cease altogether. The veil of superstition will soon be entirely removed from the purity of Chris-

tian doctrine. Christian ministers, becoming daily more enlightened, will wipe off the remnant of Paganism that has been allowed to adhere to it. The object of creation was, that its creatures should be happy here and hereafter; and the world must soon become convinced, that to attain this is possible only by obeying the will of the Creator, as unfolded by the Master of our religious system, at once the best, the purest, the most sublime, the most perfectly adapted to human nature and human wants, that the mind can conceive. Mankind, however, even where Christianity has been established, are not yet in a condition to submit themselves to the means so clearly pointed out for the attainment of happiness. They have yet to learn the value and importance of loving their neighbours as themselves. Genuine philosophy will in due time exhibit the vast intrinsic value of that precept; and the best Christian teachers will be found to merit the appellation of philosophers. Let us, then, cherish the hope, that prejudice will not be suffered to deem the objects for which the Northern Institution has been established, incompatible with the objects of religion. The farther

its members search into the wonders of creation, the more evidence will they produce of the immensity of the wisdom, power, and goodness of the Author of nature. The more closely they investigate the constitution of man, the more clearly will be seen the wonderful adaptation of Christianity to human wants. In the words of Lord Bacon, we may 'admonish 'men to continue in a sense of duty as to 'divine matters; for the senses are like the 'sun which displays the face of the earth, 'but shuts up that of the heavens. And 'again, that they run not into the contrary 'extreme; which they certainly will do, if 'they think an inquiry into nature any way 'forbid them by religion. It was not that 'pure and unspotted natural knowledge 'whereby Adam gave names to things 'agreeable to their natures, which caused 'his fall; it is an ambitious and authorita-'tive desire of moral knowledge, to judge of 'good and evil, that makes men revolt from 'God, and obey no laws but those of their 'own will. But for the sciences which con-'template nature, the sacred philosopher 'declares, 'It is the glory of God to con-"ceal a thing, but the glory of the king to "find it out.' As if the Divine Being thus

'indulgently condescended to exercise the 'human mind by philosophical inquiries. 'In the next place, we advise all mankind 'to think of the true aids of knowledge; 'and that they endeavour not after it for 'curiosity, contention, or the sake of de-'spising others; nor yet for profit, reputa-'tion, power, or any such inferior consider-'ation; but solely for the occasions and 'uses of life; all along conducting and per-'fecting it in the spirit of benevolence.'

"The first duty of a Society like this, was certainly to make an attempt to throw some rays of light on the history of that portion of the empire, in the centre of which it has been established. That history has hitherto been so involved in romance and fiction; the true character of the inhabitants so obscured by the clashing opinions of violent Highlanders on the one hand, and on the other, of superficial observers equally violent, that all sober thinkers have become unable to form a correct and impartial judgment. It is remarkable, that the destruction of the feudal system should have been followed by a sudden sweep from the memory of what was the former actual condition of Highland Society. By some, we are led to suppose that it was one

of refinement, by others, one of barbarism. We are now left to conjecture what were the uses of edifices, the ruins of which are scattered around us in plenty. We cannot ascertain at what period the iron foundery at Poolew in Ross-shire was in operation; and this is the more remarkable, as it is certain that cannon were cast at that remote place, having found a part of one myself on the spot. Since we have no certain traditions either of manners or occupations, we are left in a state of suspense, ready to believe all the good that is written or spoken of us, and not disposed to repel much of the evil. While Highlanders stand aloof without records to refer to, and tradition having fled from our most interesting scenes, there is no lack of vituperators, nor of champions. But engaging in a special cause, whether in attack or defence, is very apt to lead to misrepresentation and exaggeration in the assailant, and to somewhat of magnifying and high colouring in the defender or apologist. There need be no hesitation in saying, that all the publications that have appeared of late years, on which ever side, are more or less extravagant. We want something neutral and impartial. We want the result of

patient research, and to see our country weighed in an even balance. We desire not to be set upon the highest pinnacle of her temple, nor to have the loudest blast of Fame's often discordant trumpet. We wish our country to be placed on that solid pyramid which Truth alone can build; and that we should be considered rather as approaching, with firm and sure steps, towards the chief gate of the temple, than as having got in by a postern, opened by romancers and injudicious friends.

"Much has been said on the subject of emigration, and the measures taken by Highland landlords not only to render the soil more productive, but the population of greater value to the commonwealth. Although we have recently seen some violent writing on these subjects, the public mind is beginning to shake off the fetters of prejudice, and to see the true causes of the late changes; indeed the inevitable necessity that produced them. Had it not been for the overpowering demands for subsistence made by the industry of our sister country and the south of Scotland, (which proved at once that our population was unprofitable, and that we were too poor to make it otherwise,) the Highlanders

might still have been idly swarming in the glens, of use neither to themselves nor to others; and none of us should have known, by experience, the truth of the often quoted affirmation of Cicero, *Nihil est agricultura melius, nihil uberius, nihil homine libero dignius.* I believe I am not mistaken when I say, that none of those who have been so ready to espouse the popular side of the question, have ventured to show in what condition the people would now have been, had they not been disturbed from their stationary indolence. This was a speculation into which they were unwilling or unable to enter; or else it escaped them to consider what the consequences would have been had no change been effected. To those possessed of the talent of observation, who are acquainted with the habits of the Highlanders, it is obvious that misery and wretchedness would have resulted to the population, and beggary to the proprietors, while the country would have continued a wilderness.

"The object of this Society, in offering a medal for the best account of the former State of Society and Knowledge in the Highlands, and their progress up to the present time, was to excite, if possible, accurate re-

search, impartial inquiry; and to obtain a rational estimate of the causes which have brought the Highlands to their present state. The Society did not wish the inquiry to be made either in the spirit of romance, or in cold-blooded indifference, but in the spirit of truth. It desired that the world should know we were more anxious about future prosperity than the preservation of what is incompatible with our progress towards it, the manners and distinctions of feudalism. It desired that it might be known we were neither ashamed to avow error, nor insensible to the meed of deserved praise.

"The establishment of this Society originated in views of a much higher order than those which suggested many other popular and useful institutions in the north. We look to positive and certain improvement being derived from a stimulus given to research and reflection. Nor are our views limited so as to make us forget that "the proper study of mankind is man." We are all ready to acknowledge that unless its nature be understood, nothing can be improved. The nature of the mental constitution of man is only beginning to be known; and until it become familiar, the

efforts made to educate the people will not be attended by the success which their extent merits. But although our chief views are directed to the future, we have opened up sources of intellectual pleasure, heretofore in a great measure unknown to the people of this remote country, and which are immediately accessible. Among these, the investigation of the history and antiquities of the north stands prominent. The essay to which the medal has been awarded by the unanimous voice of the council, contains evidence of great pains and research. Only two essays have been offered, and the unsuccessful one appears to have been written by a person of much information; but it touches more on subjects unconnected with the object in view, than appears consistent with the advertisement; which circumstance, however meritorious the performance, places it second to the other. While the small number of competitors proves how much a knowledge of Highland history is wanted among ourselves, it proves likewise the need we had for such a Society as the Northern Institution. The Highlands have as yet furnished but few names of eminence in the walks of literature and science; but the

hope may be entertained that this Society will always be seen to hold up the torch, to aid the advance of unseen and modest merit towards the reward which its exertions will assuredly receive.

"It is with great pleasure I obey the Society in presenting their medal to Mr. John Anderson, whose name, I find, appears on the sealed note given in along with the successful essay; and I beg he will accept my best wishes and congratulation."

By order of the COUNCIL of the NORTHERN INSTITUTION.

GEO. ANDERSON,
General Secretary.

ESSAY

ON THE

STATE OF SOCIETY AND KNOWLEDGE

IN THE

HIGHLANDS OF SCOTLAND.

It will readily be admitted, that no branch of enquiry can be more interesting than the study of the revolutions, which have taken place successively, in the history of mankind. The causes of these various changes, and the considerations to which they give rise, open a wide field for reflection; yet what facts to select as our leading premises, how to dilate upon their consequences, and how to draw thence just and accurate conclusions, is a task of no ordinary difficulty. A glance at the history of any nation will convince the student, that to sketch the state of society at a *definite* period, he must revert to the earliest annals of that people.

I presume there is no doubt that the ancient Scots were of Celtic[a] origin.[b] When we view the first fathers of the western world emerging from the East, "the cradle of mankind,"—we perceive two great families arise.[c] These distinct races are the Celtæ, and the Goths or Scythians, of whom the former were for ages the sole inhabitants, as they had been the original colonists, of Europe.[d] By confounding the etymology of their names, historians have induced the world to believe that they were one and the same race. The learned Pelloutier[e] and Keysler contributed, not a little, to confirm this mistaken notion; and the history of Gothic migration is still veiled in darkness. Struck with the obscurity that attends their origin, some writers have assumed the Goths to have been indigenous in *Scandinavia*.[f] To support so fanciful a theory, they necessarily reject the Mosaic dispersion, and the universal concurrence by the northern scalds in their oriental ancestry.[g] The names of Jornandes, Cassiodorus, and Gibbon, are found among the advocates of a Scandinavian origin for the Gothic tribes;

[a] This word should be pronounced Keltic, although the old spelling has been retained in this treatise.

[b] Blair's Dissertation on Ossian.

[c] Genesis, cap. xi. Bossuet, Univer. Hist. 10. Joseph. Antiq.

[d] Pinkerton's Dissertation on Goths. Plutarch, iii. 126. Ross's Lectures, ii. 29. Strabo, I. ii. Grant on the Gael, 95, 96. Caledonia, i. 7.

[e] Histoire des Celtes, cap. i.

[f] See Pinkerton's Dissert. on Goths, part i. cap. ii.

[g] Mallet's Northern Antiquities, I. viii. M'Pherson's Dissertation on Caledonians, 18. Universal History, V. vi. p. 10, 13.

and the Baron Montesquieu has not scrupled to sanction by his great authority, the derivation of freedom from the teeming "storehouse" of the north.[a]

Meanwhile, the first Celtic adventurers seized upon Greece and Italy.[b] A progressive advance led their successors from the Straits of Hercules to the very *ultima Thule* of the ancient world; and this whole continent having been explored, a re-action ensued. The tide of human life borne back, discharged its resistless waves over the southern provinces of Europe. Hordes of barbarians from the upper regions of Asia, the Scandinavian wilds, and the plains of Germany, recoiled with fearful and destructive energy on the Roman empire.[c] A people arose, dissimilar in their manners, their persons, and their language, from the Celtic indigenes; before whom the latter were destined to sink into decay.[d] This second race of colonists in Europe were Goths.[e]

As the Scythian bands advanced, they appear to have swept the primitive settlers from the earth; their warfare being one of extermination.[f] When Cæsar invaded Gaul, he found the Celts confined to an inconsiderable part of that country; and that in Britain they had been dispos-

[a] L'Esprit des Loix, i. 323. [b] Bryant's Myth. vol. iii.

[c] Livy, lib. v. c. 35. Mallet's Northern Antiq. I. p. xxxvii. Ferguson's Roman Republic, i. 52.

[d] Cæsar. Bel. Gal. lib. i.

[e] Caledonia, i. 8, 11. Thomson's Etymon of English Words, p. 3, 7.

[f] Robertson's State of Socicty in Europe, p. 10.

sessed by the Belgæ, a Germanic tribe, of the southern and fairest districts. Of the Celts, the only monument remaining is their language;[a] and if grammarians may be believed, even that is corrupted by Gothic words.[b] No circumstance, however, is more remarkable in the history of the Celtic and Gothic families, than the universal influence which the principles of the latter yet maintain to the total exclusion of those of the former.[c] From the Goths, Europe has derived its physical beauty, its mental energies, and its spirit of freedom.[d] In the popular policy of the Teutonic tribunals will be found the germs of our trial by jury,[e]—the best, the sacred safeguard of freemen. Opposed to this, we discover a disinclination to consolidated government; privileges aggrandizing the individual at the expense of the community; whilst society was broken into clanships, and enfeebled by disunion,—the distinguishing characteristics of the Celtic nations.[f] Slavery in its most disgusting form was of universal prevalence,[g]—the body of the people being miserable dependents on the Druids and the Nobles. The fair sex were de-

[a] Dissertation on the Era of Ossian, by M'Pherson.

[b] Pinkerton's Dissert. on Goths, part ii. c. iii.

[c] Stewart's View of Society, 22. Northern Antiq. i. 53. Ross's Lect. ii. 24. Kames's Sketches, ii. 69.

[d] M'Culloch's Western Isles, vol. iv. p. 296.

[e] See Watkins's Tenures, Introd. Tacitus, c. 7, 11. Hibbert's Shetland, passim.

[f] Caledonia, i. p. 6, 16. M'Pherson's Dissert. p. 7.

[g] Cæsar de Bel. Gal. lib. vi.

spised ;[a] and letters were unknown, except to the priesthood, whatever visionaries may assume or dogmatics assert.[b]

From these details, we are prepared to follow the varying fortunes of the Celts to this island, where they are found established after their expulsion from the continent. That Southern Britain was peopled from Celtic Gaul,[c] and that Ireland was colonized from Britain, seems now to be conceded by all authorities.[d] Whether the primitive settlers of North Britain were from the southern tribes, is a question of more dubious import; but granting that they were not, they must still have been of the same stock. The only country from which Scotland could have been peopled, if we reject a southern origin, must have been the opposite coasts of Jutland or Germany; and prior to the Gothic conquest, these territories were held by the Cymri or Cimbri, into which nation and the Gauls, properly so called, the Celtic power was divided.[e]

At the period of Agricola's invasion, that part of the island now called Scotland was inhabited

[a] Aristotle, Polit. lib. ii. c. 2.

[b] Huddleston's Toland's Hist. of Druids, 396. Mr. Huddleston has advanced in sober earnestness, that the *Irish* alphabet is older than the siege of Troy!

[c] Gibbon's Decline and Fall, iv. 291.

[d] Caledonia, i. 15, 18. M'Pherson's Dissert. on Caledonians, 143. Whitaker's Manchester, i. 68, 433.

[e] Pinkerton's Dissert. on the Early History of Scotland, I. part i. c. ii.

by twenty-one independent tribes.[a] Until that celebrated campaign, wherein he overcame the Britons under Galgacus—when, as the acute General Roy has proved, the Roman eagles flew past our Grampian boundary, their disciplined legions had never penetrated the Highland fastnesses of the Gael. We are indebted to Tacitus for a faithful description of the hardy mountaineers scattered throughout this extended chain.[b] "Ceterum Britanniam qui mortales initio coluerint, indigenæ an advecti, ut inter Barbaros, parum compertum. Habitus corporum varii, atque ex eo argumenta. Namque *rutilæ Caledoniam habitantium comæ, magni artus, Germanicam originem asseverant.*" The German origin of the Caledonians is here distinctly traced; the same strength of limb, the same red hair; and the ancient writers who follow Tacitus, denominate this race by the Latinized appellation of *Caledonii.* Towards the end of the third century, they were blended with the Picts or Peithi,[c] a term first applied to them by Eumenius, the Panegyrist; and, before the conclusion of the fourth, this name had superseded every other. Nevertheless, it is universally admitted,[d] that they remained one and the same nation.

Yet the question of the Celtic or Gothic origin of the Pict continues to divide the learned

[a] Caledonia, i. 58, and 113. [b] Tacitus in Agricola.

[c] Caledonia, i. 201.

[d] Pinkerton's Inquiry, i. p. 105, 107. Innes's Essay, i. 46. 48. Dr. M'Pherson's Dissert. 27. 55. Caledonia, i. 191.

world at this day; and to foment a dispute in no way conducive to the honour of our country. During however the contention of various opinions, we may still indulge a hope, that the increased zeal of archaiologists, aided by the surprising advances made of late years in philological inquiries, may conduce, together with the scattered rays which ancient chronicles afford, to elucidate, beyond the fondest hope of former times, those distant epochs of our history, which have been too truly described as ages of darkness. Of the real history of the Picts, we learn from Beda, that they possessed the northern parts of the island beyond the Firths; but they appear, in the fifth century, to have broken through the barriers hitherto opposed to them by the Romans, and to have flowed in an overwhelming tide to the banks of the Humber.[a]

We are now arrived at a very interesting period of our annals, for the events which crowd upon us are mighty and important. The Pictish kingdom at the height of its power; the establishment of the Strath-Clyde-Britons; the departure of the Romans; the invasion of the Provincial Britons by the Picts and Scots; the arrival of the Saxons in the Lothians; the Scottish colonization of Argyll; the invasions of the Norsemen, and the final union of the Picts and Scots;—these are the scenes displayed on the theatre of modern Scotland. It will be enough

[a] Pinkerton, i. 341.

to single out the Scottish settlement as the most important in its consequences. The preceding observations were intended to conduct the reader to this point, through a progressive acquaintance with the character of the primitive settlers. They have enabled me to show some of the distinguishing features of the Gothic and Celtic policy, and what people from either hive migrated to Britain. Had I commenced my remarks with only the domestic history of our Scottish ancestors, properly so called, I should have laboured under those disadvantages, which every one must do, who plunges headlong into his subject; and should have been compelled to diverge from my path by explanatory illustrations of our Celtic characteristics. If I now proceed to enlarge upon these, the difficulties which obstructed our advance have been considerably diminished.

The Roman power was never firmly established in North Britain;[a] her rude inhabitants being only curbed, not subdued. The ramparts of Adrian and Antoninus, and the scattered forts along the Murray Firth, bespeak no less the progress than the terror of the Romans. Between the walls they had succeeded in organizing their province of Valencia; but the swarms who were to avenge their fallen friends, roamed uncontrolled beyond the Forth. Harassed by the repeated incursions of the natives, the Romans finally quitted the island in the year 446,

[a] Whitaker's Manchester, i. 417.

during the reign of Honorius, Ætius being consul, and left the Britons to their fate. Then a dreadful crowd of *Scots* and *Picts* rushed over the frontiers,[a] and the unhappy provincials, after venting their "groans" in despair, "that the barbarians drove them to the sea, and the sea back to the barbarians," called to their aid the Saxons, who forthwith came and effected an important change in the liberties and language of their feeble allies.[b]

Learning has hitherto fatigued itself in vain attempts to penetrate the gloom which envelopes the origin of the *Scot;* and of the general tendency of mankind to cling to the marvellous, the pages of our national writers bear peculiar testimony. Dr. Robertson has well remarked, that we carry our pretensions to antiquity to as high a pitch as any of our neighbours.[c] Ridiculous prejudices, built on the supposition, that our independence as a people was involved in the question, first gave rise to the puerilities with which our histories are so plentifully garnished; as if the honour of a nation were to be raised by falsehood or by fable! Thanks to the enlightened intelligence of the age, we may hope that the time is at length arrived, when, under the influence of the various associations formed for the patriotic purposes of historical research, our antiquities shall be rescued from the mists

[a] Gildas, cap. xv.

[b] See the Gododin of Aneurin in Welsh Archæol. v. i. Whitaker, ii. 15. and 94.

[c] Hist. of Scotland, i. p. 1.

of ignorance; when the fabrications of monks shall be treated with contempt, and unlettered vanity will no longer warp the national judgment, but truth and sound criticism succeed to both.[a]

The relics of Greek and Roman lore are now perhaps the only authentic sources whence we may collect the earlier history of this country. Among the various nations which they enumerate, the *Scots* appear for the first time in the end of the third, and in the beginning of the fourth century. Porphyrius the philosopher is the oldest author who treats of them:[b] Ammianus in the year 360 joins them with the Picts, as if they formed one army, although they had no common interest but plunder;[c] and in 368, Claudian thus extols the triumphs of Theodosius over their united arms.

——————————*Pictos*
Edomuit, *Scotumque* vago mucrone secutus.[d]

The Etymon of the term, as well as the descent of the Scot, were for a long time fruitful themes of dispute between the Scottish and Irish historians. Like the mutual animosities of the Scots and English, the temper of the writers became as keen as the swords of their warriors.[e] But the voice of truth has at last prevailed over interested prejudice, and the Irish origin of our countrymen seems

[a] See the "Summarie of the Scots Chronicles, by John Monipennie, 1612.

[b] Lib. xxvi. xxvii. xxviii.

[c] Caledonia, i. 193. Innes, ii. 644.

[d] Claudian de iii. cons. Honorii Aug. Paneg. v. 52. and de iv. cons. Hon. v. 26.

[e] Leyden's Scottish Descriptive Poems, 177.

now to be generally admitted.[a] The recommendation of Cambden has not gone by unheeded.

The "Scoticæ Gentes" are found in Scotland, (as I have said) towards the end of the third, and commencement of the fourth age of the Christian era. We do not read of them, however, as permanent settlers, but as confederates with the Picts against the Roman power.[b] And thus they continued to migrate, obliged to retire to their paternal isle before the arms of Rome, or the jealous resentment of the Picts, till A.D. 503,[c] when Loarn, Fergus, and Angus, the three sons of Erc, the descendant of Carbre-Riada, led the Scots back to North Britain, and settled the Dalriadinian dynasty. For a period of nearly 400 years, the most violent contentions raged between these Scoto-Irish colonists and the Pictish inhabitants, engendered by the diversity of tongues and customs,[d] and the contempt with which the mountaineer looked down upon the more ignoble cultivator of the plain. In the dissensions of a rude age, little can be found to challenge attention or reward inquiry; and when we even approach that important period, when, by conquest or alliance, the two nations merged

[a] Caledonia, I. 271. 193. Pinkerton's Inquiry, II. p. 59.

[b] A. Marcellinus, lib. 27.

[c] Caledonia, I. 269, NOTE, and 274. Pinkerton's Inquiry, II. 64. 93.

[d] Innes's Essay, II. 689. 694. Thierry, Histoire de la Conquête de l'Angleterre, tom. I. p. 371.

into one, anno 843, fiction is before us blotting out even the feeble light which breaks upon a history of a Cimmerian darkness. Common sense has been set at nought by writers, who would have us believe that Kenneth, the son of Alpin, exterminated the Picts! O'Flaherty was not to be taken in by this monstrous and extravagant conceit; and the learned Innes has compelled its supporters to abandon their position, more quickly than the Scots annihilated the Picts![a] Reason must teach us, that the Picts lost their name by incorporation with the Scots;[b] but the vanquished had to submit to no unworthy servitude, or political degradation. The conquerors left their ancient seat in the west, and settled in the milder regions of their former foe, to whose territories and their own, they, in the tenth century, gave the appropriate name of *Scotland*.

Having thus seen this great revolution effected, it becomes us to view its important consequences to the Highlands of Scotland; upon whose real history, truth, for the first time, may here be said to dawn.

In glancing over this remote event, it will strike us that the dominant policy of the natives would necessarily have its source in the principles of their Celtic ancestry. Through their whole history may be traced those principles which continued almost to our day, to paralyse the resources of the community, and to repress

[a] Essay, I. 145. 166.

[b] Thierry, Hist. de la conquête de l'Angleterre, 1. 369.

the exertions of individuals. These enfeebling causes are to be found in the two prominent features of the Celtic tribes; their disunion and hatred of letters.[a] A necessary consequence of their adherence to the first, was an endless division of interests to the prevention of vigorous and consolidated government, a separation into local and petty communities agitated by intestine discord, and jealously averse to mutual confederacy. To the maxim—that it was unworthy of a martial nation to transmit their memorials to writing, is owing that dense cloud which veils the antiquities of our country. Hence the rapidity with which our authors have consigned to oblivion, all that precedes the era of Malcolm Ceanmore.[b] Whatever lore existed among the Celts, was confined to their bards.[c] Severe and long was the ordeal by which these attained to distinction;[d] and their decay is a silent concession to the influence of useful letters over an instrument so feeble as traditionary verse. But the triumph of knowledge, though complete, has been of recent date; and hence the long night of darkness which we encounter, whenever we would investigate the earlier annals of a people, who trusted their exploits and domestic occurrences to the treacherous memories of men, led

[a] Caledonia, I. p. 200, 204, 475.

[b] Vide Robertson's Scotland, 4. Hailes's Annals.

[c] Fosbroke, Ency. II. 666.

[d] Dr. Blair's Dissertation on Ossian, 380. Johnson's Works, viii. 349.

alike by interest and inclination, to interweave the fables of adulation with the severity of history.

In making these observations, it may be seen that they apply to the whole territories of the Scoto-Irish,—Lowlands, as well as Highlands. From the epoch when these settlers overran the east of Scotland under their king Kenneth, the Irish language became the leading tongue, and the descendants of these Irish continue to speak it to this day, in the original seats of their progenitors in Argyle, as in those more extended possessions to the north, which they acquired by conquest. Thus, when we turn our eyes to the characteristics of her people at the era of Malcolm III., we find, as a basis to our inquiries, that Scotland was then purely Celtic in her institutions.

The first rudiments of civilization and policy are discernible in this reign. An important benefit was then imparted to the empire. By Malcolm's union with Margaret,[a] the sister of Atheling the Saxon, and the arrival of Anglo-Saxon and Norman refugees, new sentiments of politeness and knowledge insensibly spread among the natives: an instantaneous revolution in these particulars, was incredible, whatever our theorists may assume. Many of these strangers acquired estates by grant, by violence, by marriage, by occupying waste land, by purchase.[b] They brought with them new and dissimilar no-

[a] Flor. Wig. 432. [b] Hailes's Annals, I. 30, 1.

tions as being of Teutonic origin; which, in the maturity of time, were to effect important consequences. Celtic customs were insensibly to be superseded; the Celtic government reduced, and Anglo-Norman jurisprudence firmly established. The reign of David I. was eminently propitious to this revolution. These foreigners extended their settlements into the Highlands, where they transmitted in their respective sirnames, the memory of their Scandinavian ancestry. We recognise these favourites of a new policy in the Campbells, Gordons, Chisholms, Mackenzies, Cumines, Grants, Frasers;[a] and the late learned Dr. Murray was of opinion,[b] that much as our countrymen prided themselves on a Celtic extraction, there is not an ancient name of any consequence in the Highlands, which does not betray its northern source.[c] Such he

[a] Caledonia, I. 596.

[b] Transac. Scot. Antiq. II. p. 153.

[c] Yet writers will descant on "the remains of the most ancient, *unmingled*, and *original* people in Europe!* forgetting that a complete answer to their theories is peculiarly observable in the retours and earlier title deeds of the thirteenth and fourteenth centuries, where the inquest and witnesses are de Ross, Byset de Loveth, de Cubin, Cuthbert, Vaus, Fentoun dominus de Beauforth, de le Ard, de Chesholme, de Boscho, de Cheyne, de Routh, de Graham, de Lauder,† "custos castri de Urquhard." In a service, dated 11th February, 1431, of John Rose of Kilravock, William Mykle, and Hugh Adamson are two of the persons sworn, persons evidently not of Celtic descent. The following translation of a singular document in the museum of the Northern Institution of Inverness, is interesting, as evincing that in the reign of James II. sirnames had not been universally adopted in the Highlands. Prior

* Mrs. Grant's Essays, I. p. 7. Grant on the Gael, 30.

† Chart of Moray also.

sets down the septs Macdonel, and Macdonald, Maclean, Cameron, Mac-Chailean, M'Leod,

to that period, in a valuation of the lands of Kilravock and Easter Geddes, made at Inverness, A.D. 1295, the inquest are styled by their peculiar callings, as "Thomam Venatorem, Robertum Falconarium, Fergusinum Indicem." Others by the simple notice, "Johannem filium Duncani, Walterum filium Thomæ," &c.

"This inquest was held at the town of the liberty (Immunitatis) of Tain, on the twentieth day of the month of April, in the year of our Lord, one thousand four hundred and thirty-nine, by the underwritten honourable men, viz. Alexander Sutherland, master of that ilk; William Leslie, sheriff of Inverness; Hugh Ross of Balnogown, George Munro of Fowlis, Alexander M'Culloich, Alexander, son of Henry Sutherland, John Sutherland, William Calder, William Tarale, *Hugh, son of Alexander*, George M'Culloich, Hugh, yr. of Munro, *Donald, son of Symon*, Farquhar Reyid, burgesses of Inverness; John Moir of Caldrosse, John Bayne, Donald M'Tyir, Donald Saskrem, John Spens, *Andrew, son of Allan*, Andrew Tarrale, John Monylaw, and Alexander Skynnare. Who being sworn by the great oath, being taken by them conjunctly and severally, in the said inquest, found and perfectly and fully understood, that all the inhabitants within the foresaid liberty of Tain, and all their goods whatsoever, are under the special protection of the apostolical see; and that the said immunity was *first founded* by the deceased most illustrious king of Scots, Malcolm Canmore, of blessed memory; and that afterwards, the foresaid immunity was confirmed by various kings, and illustrious princes, viz. David the Bruce, Robert, his grandson, and the last Robert, son of Robert the First; and that the said inhabitants, in the town of Tain, have and had full and free power and privilege, to buy and sell all goods whatsoever, within the four angular crosses of the said immunity; and that they have never paid, neither shall they pay, on any account, any contribution to the kings of Scotland, nor to the earls of Ross, except the custom to our sovereign lord the king; and lastly, that it is lawful to all the inhabitants within the said immunity, to work and navigate, with all their merchandize, and goods whatsoever, everywhere

at their pleasure, without any contradiction or further demand, by virtue of the privilege of the often-mentioned immunity, as it shall appear most expedient to them. In faith and testimony whereof, the seals of some of the foresaid honourable men, (who were

Macdugal, Macdiarmid, Maclaughlan, (M'Lochlin) the son of the Dane. "It is not to be borne that such blood should forget itself, (says Dr. M'Culloch) and enlist under banners which it trampled under foot."[a]

To the fatal dissensions among the native reguli, I am inclined to think is the firm establishment of these strangers, mainly attributable; and to their settlement, may also be referred the hereditary rancour long inherent among the Highland clans. These looked upon the Norman barons as intruders; and the first step to security by the latter was the erection of a strong hold, around which their followers sat down.[b] As these barons brought with them a knowledge of feudal tenures, they would be anxious to defend their acquisitions against the old inhabitants, by a confederacy of their own retainers;[c] to whom they would parcel out lands, under an obligation to support their mutual interests. By the silent operation of circumstances, and the deaths of the primitive settlers and their antagonists, congenial ties would unite the descendants of these dissimilar people. The Norman heir would be continued in his paternal do-

summoned to attend the foresaid inquest, under the impression of the seal of the great and powerful lord, Alexander, earl of Ross, lord of the isles, and supreme justiciary of our sovereign lord the king, on the north side of the Frith of Forth,) are appended to this present inquest, place, day, and year, foresaid."

[a] Letters, IV. 297. [b] Caledonia, I. 610.

[c] Robertson's State of Society, 14. Hailes's Annals, 30.

mains, and a system partaking alike of the feudal principles of the lord, engrafted on the patriarchal ones of the vassal, become tacitly established. In proportion to the separation of the superior, however, from his connections in the southern parts, his attachment to the Celtic usages of his people would be invigorated; and both he and his national followers, as the smaller body, would imbibe the language of the country. Thus the divided materials of the Celtic tribes were peculiarly fitted to the designs of a bold and ambitious chief; interested in imparting a more forcible spirit of union to his own people or clan, by the introduction of feudal penalties; whilst he permitted their ancient spirit of distrust to remain, as against other septs, and thereby insured their obedience on all occasions to his commands.[a]

But if Mr. Whitaker's position could be relied on, we could the more readily see how the Norman and Celtic policies blended so easily together. He found British customs, British institutions everywhere. His very visions were of the Britons; and to his favourite nation he boldly refers the primary existence of feuds, even, before the Norman conquest. He forgot that the founders of feudality were northerns and freemen; that in their original constitution, and before feus degenerated, the soldier was bound to no servile and indeterminate services.[b] He

[a] History of Manchester, I. 262.
[b] Robertson's State of Society, 18.

was a free agent, who voluntarily followed the chief of his choice,—attracted by his beneficence, or anxious to partake of the glory of his exploits.[a] But as these conquerors had their acquisitions to maintain against the vanquished natives, as well as fresh invaders, they subjected themselves to a police, under which each warrior was bound to appear in arms for the defence of his allotted portion. Military service was the sole tenure of the synonymous terms of soldier and freeman; and *self-defence*, the basis on which feudality was established. It was in after-ages, when by the gross usurpations of the aristocracy, fiefs had been rendered hereditary, and the people had sunk under the thraldom of tyranny, that the principles of feudal policy, never intrinsically sound, lost their original purity; and those debasing servitudes were introduced, which disgust in the investigation of the feudal system. But forgetful that this system had its origin among nations where *personal* liberty and independence were so highly rated, Mr. Whitaker must refer it to the primitive Britons!. because he finds traces of certain rights of supremacy, exigible by the overlords from their vassals in the laws of Howel-Dha, overlooking entirely the important distinction betwixt the principle of *self-defence*, which gave rise to the real feudal establishment, and the menial exactions wrung from a British people,

[a] Cæsar. lib. vi. Tacitus, c. 11.

to whom two ranks, the nobles and the villains, (as he himself admits,) were alone known;[a] the latter "bound to services the most servile, disposeable at will, and saleable as a part of the estate."

The ingraftment of the feudal system on patriarchal attachments in the Highlands, must, as I have hinted, have been progressive. I say patriarchal; for in the infancy of communities, much as the question has been agitated,—whether monarchy or democracy be the most ancient form of government?—there seems just reason to believe, that society is but the picture of each individual family. As the father is regarded as the head by his children, so the qualities of bravery or wisdom gain for their possessor the applause of the multitude. By insensible means, these secure permanent control; and the merit of the ancestor leads to a hope of finding it in his progeny. Hence the formation of small societies, in which a leader is chosen; and hence also the growth of these into clans. In the infancy of their existence, these associations excite emotions of pleasure and regard. They were directed by a chief elevated by the public voice; or permitted to command from respect to his sires. He was their leader in war, and their judge in peace. He fixed his habitation in the midst of those whom he looked upon as his children, whilst they regarded him as their

[a] History of Manchester, I. 259, 261.

parent. His table was open to all his people; and he dispensed a generous and primitive hospitality.[a] It would indicate too slight a knowledge of human nature to suppose that such a state of society could be of long duration. It is clear, that that control which became the birthright of the chief, would beget tyranny and caprice. With no check upon his passions, with no laws to limit his prerogative, his power and his pride would rise, in the exact proportion that the spirit and demeanour of his vassals fell. And as each chieftain possessed the right of making war and peace, avarice would tempt him to extend his territories at the expense of another sept. Hence, among other causes, sprung those deadly feuds which have desolated every valley of the north. With an extraordinary attachment to their own clan, the tribes both of Ireland and Scotland have ever evinced a singular antipathy to all beyond that narrowed pale. It was customary, when any rancorous enmity subsisted, to leave the right hand of male children unchristened, "to the end it might give a more ungracious and deadly blow."[b] Symbolical insignia were borne by each sept to distinguish their kinsmen, or to descry their enemies. Thus the M'Leods wore the juniper; the Frasers the yew; the M'Intoshes the box; the M'Donalds the crimson heath; and each clan also dressed in a peculiar

[a] Tacitus de Mor. Ger. c. 21. Dalrymple's Memoirs of Great Britain.

[b] Campian's History of Ireland, p. 15.

set or pattern of tartan.[a] At the sound of the "slughorn," these hardy mountaineers rushed to the fray, heedless of every thing but the "character of the chief and the rights of the tribe." Oft have the recesses of Strathspey re-echoed the Grant war-cry of "Craigelachie;" the wilds of Ross the "Tullichard" of the M'Kenzies; and other districts the peculiar gathering of their respective inmates. To these marshallings, the "honour of the chief" seems to have been as strong an incentive as any other. To swear by his "*chieftain's hand*" was a common oath;[b] and there is no people whose history more clearly evinces the dependence of the subordinate on the higher ranks, than the Celtic colonists of the Highlands. It was a polity wafted from their native isle;—a policy which, in common with the *pentarchy* introduced into Scotland from the same quarter, was the source of misery, anarchy, and bloodshed. From Ireland also, our ancestors derived the law of *Ta-*

[a] Mrs. Grant's Essays, II. 207.

This has however been doubted, distinctive shades of costume being of questionable antiquity. In remote times, the Highland gentleman was apparalled in much the same garb as his southern equals; that is to say, his coat was of cloth embroidered with lace or other ornament, and when he went to war he wore armour. In more recent days of which we have memorials, his dress was tartan, or cloth, whilst his followers were too poor to afford minute attention to the shade of the die: so that they *were* clothed it was enough.—(See M'Culloch's Letters, i. 184, 185, 186; and Scots Chronicles by Monipennie.)

[b] Lady of the Lake, canto iii. st. xxxiv. and notes, 354.

nistry;[a]—an elective franchise, where the passions of a rude people must have been often aroused to the destruction of settled government. If it be asked, why the *Saxon* laws and customs have effected so little, or rather no influence on the inhabitants of the Highlands, till modern times; an answer will be found,—in the inaccessible nature of the country, destitute of approaches, and presenting little to the cupidity of settlement. Another and more forcible reply, may be had in the policy of the Norman barons, who having wrought just so much of a change in the national manners, as suited the firm consolidation of their own authority, were solicitous to lose their appropriate characteristics in those of their adopted countrymen. Jealous of the Saxon power, though of the same generic root, it was their interest to repress the advance of these into the Highlands, by exciting a spirit of animosity against them, as foreigners and invaders. How dire the hate of Saxon and Gael, let history tell! and the hostility thus awakened, deprived the Highlanders for a series of ages, of the blessings of civilized life. A military people, they despised every occupation but war; and held literature and commerce in equal contempt.

The martial bias thus aroused, had ample room for display. To the north, were those colonies

[a] See on the Law of Tanistry, Spencer's View of the State of Ireland, apud Works, Lond. 1805, 8vo. viii. 306.

from Denmark and Scandinavia, whose descendants still people the Orkneys and Caithness.[a] To the east lay the Flemish inhabitants of Murray.[b] The Saxons had established a footing in the south; whilst on the west, the incessant incursions of the Vikingr, and islemen, called for vigilance and resistance. Among these dissimilar people the sword seldom slept; and the last remnants of the Celtic race, pressed on all sides by the descendants of the Gothic family, had to contend, not for conquest, but existence.

A double effect was produced by this baneful enmity engendered by the Normans among their Celtic followers, towards the Saxons. Independent of a hatred to the persons, it contributed to withhold from the highlands the usages of this nation. Hence the almost total absence of villages and towns. These were erected by the Saxons; and wherever they extended themselves, were the happy consequences of their settlement. To the Saxon Edwin, Scotland owes her capital; and it was under the protection of strengths similarly situated as is the Castle of Edinburgh, that "towns arose, and industry began her career."[c] The sturdy burghers learned to cope with the petty despots around; and the dissemination of intelligence and capital (the results of public spirit and union) gradually lessened

[a] Torfæus, Orcades. [b] Chart. Moray, Shaw's Moray, App. XIV.
[c] Caledonia, I. 610.

the power of the aristocracy, and placed the freedom of the subject on a rational basis. It was in the opposition of the cities of Italy and their dependancies to the tyranny of the Barons, who held them as feudatories of the state under the German Emperors, that the liberty of the republics of the middle ages originated.[a] But the genius of the Celtic policy was averse to these associations: the public safety or utility was never looked to. They viewed with indignation the erection of townships,[b] and repeatedly rose upon the inhabitants; as the history of Morayshire, or Inverness itself amply attests; and hence also, the feudal notions of obedience and attachment to the chief, gained additional strength by contrast: For as the leader affected to look down upon the more ignoble burgher,—his people in imitation would do the same. From habit, and from the nature of their institutions, these followers were the implicit bondsmen of their Lord. They were villains chained to the soil.[c] The introduction of feudal notions

[a] Sismondi. [b] Caledonia.

[c] Fragments of Scottish History, 26. M'Culloch, iv. p. 444. Whitaker, I. 259.

The author of fragments of Scottish History gives innumerable instances of the slavery entailed upon our ancestors. In the museum of the antiquaries of Scotland is a brass collar, bearing this inscription: "Alex. Steuart found guilty of death for theft at "Perth,—the 5th of December 1701,—and *Gifted* by y^e^ Justi-"ciars *as a perpetual servent* to S^r^ Jo. Areskin of Alva." Is any one ignorant that colliers and salters were in a state of thraldom in Scotland, till the stat. 39th Geo. III. c. 56. (June 13, 1799) put them upon a footing with other labourers? Yet the author

rivetted their fetters: Thus the Highlanders became dependant on arbitrary power, exposed to its caprices,—destitute of redress,—and deprived of the means of self-advancement or improvement. Hence further,—from the strong line of distinction drawn by the Celtic tribes,—and from the inclination which man in a rude state ever has, to despise the means of existence which are not gained by force of arms,[a] a sentiment of pride took root. A hardy and enterprising warrior deemed the exploits of his ancestors more worthy of admiration, than the humbler pursuits of the Saxon: His people boasted an alliance with the chief,—the bards were ever ready to swell the asserted title by the license of verse; and thus a fancied superiority over all other people,—an attachment to the pomp of ancestry,[b] and a contempt for its want, have descended, in the Highlands, every way baneful; for, while pride among the better sort has been found the attendant on poverty, we discern, amid the lower ranks, tame and unresisting submission to their superiors, a disinclination to labour,[c] and a proneness to court men in power. The respectful and cautious defe-

of Caledonia seems not to have been aware of the necessity of legislative interference in regard to this unhappy class, when he asserts that long before the days of Craig the feudist, who died in 1608, bondage had become obsolete in this country.

[a] See Birt, I. 93, for the aversion of the Highlanders to any profession.

[b] Birt, I. 93.

[c] Birt, I. 105, and Johnson's Journey, Works, viii. 319.

rence of our countrymen at large, to the great, may, I have little doubt, be safely attributed to that absence of individual independence observable among our Celtic progenitors. Let no man, however, imagine, that I state these deductions with the view of indulging personal pique, or wounding private feelings. I can myself feel as a Scotsman upon the subject; but he is unworthy of attempting any portrait of his own people, who can allow national bias to warp his judgment, or distract his narrative. The failings which our forefathers are reproached with, must attach to all who own a similar origin; but if truth be the object, it is our sacred duty, not to hide, but to expose those failings, in the hope that we may avoid the rocks on which they have struck.

But it may be said, that my conclusions are built on the premises that none but Normans emigrated to the Highlands. The observation would be just; but I conceive the answer to be easy. So far as history guides us, we have no evidence that the Saxons penetrated into our mountains: If they did, their numbers were too feeble to make much impression. The remarkable *introduction* of feus was owing to the *Normans:* their final *establishment* and *perfection* over the kingdom, to the gradual subversion of ancient customs; and the former were adopted by the heads of Highland Tribes as a powerful addition to their primitive authority, since by fines, reliefs, the services of tenants and the like, their revenue was augmented, and the union of

their people more securely fixed: and in truth, to my mind at least, there has always appeared a wide distinction between the Norman and Saxon usages. The feudal law of England was the child of the Norman invasion,[a] yet the Saxons stoutly resisted its enforcement, and not till 1085, did William the Conqueror obtain the consent of his great council to its legal establishment. To the *common law* of the land, the Saxons pertinaciously adhered;[b] and this favoured system has triumphantly weathered the Norman settlement. Society among the Saxons, is one of the most remarkable pictures of history. The partition of their kingdoms into tythings, hundreds, and counties, has been justly denominated "the most accurate model of domestic economy reduced to practice by a military nation."[c] The Saxons' policy certainly partook of a feudal character; but being formed on the model of their German fathers, (who were the founders of the system) it provided for the security of individual liberty, whilst it preserved the public power, more amply than the military tenures of the Normans, burdened with vexatious penalties, derogatory of the simplicity of the institution.

A very striking proof of the diversity of races, and of the fact, that Norman invaders acquired

[a] Caledonia, I. 738.

[b] Hailes's History of Common Law, p. 60. Robertson's State of Society, Note IV. sect. I. p. 12.

[c] Whitaker's Manch. II. p. 114, 148.

an ascendency over the native tribes,—is found in the distinctions of form and feature among our Highlanders:[a] the Gothic blood predominating among the Magnates, or *Duine-Wassels*, who are taller and stouter than their inferiors, of Celtic parentage. Doubtless, there are exceptions; but the words of a well-known writer may not be deemed too theoretical: "That throughout the country, superiority of wealth or stature belongs to the Gothic race; whilst the Celts are everywhere the lower caste of society."[b] I have already attempted to show some of the effects of the union which took place between these Gothic intruders, and the natives who became their vassals. An important one remains. We have spoken of the diversity of Celtic *tribes*, but the "*Highland Clan*," properly so called, must have been a formation of more recent date. The author of "A Dissertation on the Poems of Ossian,"[c] with a self-sufficiency not a little amusing, boldly lays it down, "that it was after the accession of territory which the Scots received on the retreat of the Romans from Britain, that the inhabitants of the Highlands were divided into *clans*." A more erroneous assertion was never made: For it is manifest to common sense, that as these tribes were severally, and peculiarly distinguished, their establishment cannot mount up to an era

[a] Gartmore MS.

[b] M'Culloch's Western Isles, IV. p. 255. [c] P. 349.

beyond the introduction of sirnames. These are generally attributed to Malcolm Cean-mòr; but it is very questionable if they existed before the reign of David I. It was in this reign that Gothic colonists poured into Scotland; and the gradual assumption of their new leaders' name by the native septs, was doubtless the origin of these imaginary families. But their general antiquity must rest on the probable settlement of each chief in his Highland domains; and as our national records cannot supply the answer, we are left to conjecture the growth of new Clans from the reign of David I. till perhaps long after the accession of Robert Bruce, in whose time it is well known many Lowland Barons received grants in the north.[a] In what way the rude tribes of early Celtic ages were distinguished, we have no evidence; but we can easily discern how in after periods, a body considering themselves as one family, distinguished by one common name, and concentrating their affections and feelings in a narrowed compass, would prove formidable amidst such distracted politics as those of Scotland.

Some writers have drawn a view of the clan policy, as representing, in every particular, a coincidence with the feudal one, but as existing here long anterior to the Norman invasion. Their conclusions are built on premises taken from a period *after* the Normans penetrated into Scotland, and

[a] Robertson's Index to Charters.

therefore manifestly derived from wrong data. Nor is the distinction which has been attempted to be made between the western clans and their brethren on the mainland better founded. It is clear from history, that the western isles were inhabited during the early ages of the Scottish dynasty, partly by a Gaelic—partly by a Scandinavian race, the doubtful tributaries of the Norwegian monarchs. Orkney and Shetland also owned the Norman's sway, as did the nearest shores of Caithness and Sutherland.[a] A Celtic people held the mainland of northern Scotland; and as a nation of dissimilar origin were the invaders of her domains at all these different points, they must have brought with them dissimilar ideas of government. These ideas were feudal, and their dissemination would have had a tendency to assimilate, rather than diversify the features of the respective tribes. Had Scotland, *properly* so called, been free from foreign aggression, there might have been cause for varying characteristics among the clans of the mainland and those of the isles.

In considering their internal aspect, I have assumed the power of the chief to be absolute, and his followers divested of all control. It may be expected I should go more fully into the causes of this dependence; for I am not ignorant that it may be said, the authority of the feudal sovereign was originally extremely

[a] Torfæus, Orcades.

limited; that beyond the services expressly stipulated on the investiture of the feu, none were exigible from the vassal without his consent,[a] whilst the lord was bound to hold a court for the government of his *seigneurie*, at which his tenants assisted with their advice.[b] But it must be remembered, that the exercise of such a prerogative implied the co-existence of a civil and criminal judicature.[c] In the settlements effected by the Teutonic Barons in the Highlands, such powers would in all likelihood have been forcibly assumed, or conferred upon them by the gift of the sovereign, as the only means of establishing a dubious supremacy. Extensive tracts of country, thus subjected to the control of a particular chief, became the property of his issue; and *heritable jurisdictions*[d] continued to distract the course of justice till a comparatively recent period. Such a policy, by submitting every thing to the sway of one man, left nothing as a counterpoise for the unfortunate people. The tendency of the Feudal Institutions, though founded on subordination, verged to independence;[e] and the usurpations of the nobility over Europe, whilst they dissolved the bonds which connected them with the Crown, reduced the commons to a state of slavery. In Scotland, and

[a] Cruise on Dignities, 9.

[b] Craig, Lib. ii. Tit. ii. cap. 10. Whitaker's Manchester, II. 170.

[c] Glanv. Lib. viii. c. 10.

[d] Pinkerton, I. 366.

[e] Robertson's Charles V. vol. IV. p. 16.

especially in the Highlands, these powers took a deeper and more vigorous root from accidental circumstances: the mountainous nature of the country, the want of towns, their distance from the seat of government, and their leagues for mutual confederacy,[a]—being all causes which

[a] Acts of Scottish Parliament, fo. ix. app. 60.

The following instances will exemplify the nature of these associations:—

(From M'Farlane's MS. Genealogical Collections, vol. i. p. 227, in the Advocates Library, Edinburgh.)

"This indenture made at Forbes, the ninth day of August, the year of God one thousand four hundred threescore and seven years, Betwixt an Honourable Lord William, Lord Forbes, Sir Alexander Forbes of Pitsligo, Alexander Forbes of Tequhan, Arthur of Forbes and John of Forbes of Brouchous, on one part, and honourable men, Duncan MacIntosh, chief and captain of Clanchattan, Hutcheon Ross, Baron of Kilravock, Lauchlan and Allan MacIntosh, brother to the said Duncan, on the other part, proposts and bears witness,—That it is fully appointed and accorded betwixt the said parties, in manner and form as after follows: that is to say, the foresaid Lord Forbes, and his party before written, binds and obliges them (baith for themselves, and all and sindry their kin men, party and inheritance that will adhere to them, to keep hairtie friendship, kinrent, love, and tenderness, and to take oppen upright pairts in all and sundry their causes and quarrels with the foresaid Duncan, Hutcheon, Lauchlan and Allan, and till all their kin, men, pairty and inheridence; and if any manner of man scaps or would scap for their deeds, disherisone, banishing or undoeing, the said Lord Forbes, and his party, shall defend them at all their goodly power, baith be slight and might, and doe for them as for their awin person, kin or men, keiphand his allegiance and service to our sovereign Lord our King: And in like manner the foresaid Duncan, and his party before written, binds and obliges them, baith for themselves and all and sindrie their kin, men, party, and inheridance, that will inherite to them, to keep hairty friendship, kinrent, love, and tenderness, and to tak oppin upright pairt in their cause and quarrel to the said William Lord Forbes, Alexander, Alexander, Arthur and John, and all their kin, men, pairty, and inheridance; and if any manner of men scaps

augmented the authority of the aristocracy.[a] Add to these, the servile condition of the lower class among the Celtic tribes, and the conse-

or would scape for their deeds, disherison, banishing or undoeing, the said Duncan, Hutcheon, Lauchlan, and Allan, and their men, pairty had inheridence, sall defend them at all their goodly powers, baith be might and slight, defend them, and do for them as for their own persons, men or kin, keepand their allegiance ever to our sovereign Lord the King, and the said Duncan and Hutcheon keepand their allegiance to the Earl of Ross and Mair, attour ilk ane of the said pairties are obliged to others, That they shall never ane of the na of ther men for ony manner of meid, na or reward to come, na gang to make hership, slaughter or disturblance on the tother in time to come, and that all and sindrie their accord and pointnent shall be leill and truely keepit without fraud or guile to the langest livand of them twa, and their bairnes gotten of them, and all that comes of them, and this bond perpetually to endure for evermore, *and to the security of this either of the pairties has made till uther their great bodily aithes, the haly Evengell tuched, and whoever brakes in ony of their conditions sall be hauldin infamous, men sworn to renounce their faith of Christ, and never to be heard in proof na witness, na ly in kirk, nor Christian burial.* In witness hereof the said pairties to thir indentures interchangablie had affixed their seales for the langer livand of either pairties."

*The Lairds of M'Intosh, Calder, Fowles, Slait and Kilravock, entered into a friendly bond and treaty to have the same friends and foes in common with M'Intosh,—not to make war or alliances without his concurrence, and to send assistance when required to do so.—Letters of Association, dated at Inverness, 30th April, 1527.

†Ronald, the son of Ronald M'Donald, Glaish a Gargochia, granted an hereditary bond of obligation of suit and servitude for himself, posterity, relations and clients! with warrandice by oath against all mortals, (the Earl of Athole alone excepted) to M'Intosh and his posterity, on 12th June, 1572. The deed is dated at the Isle of Moy, before James M'Intosh a Gask, John Forbes a Jolly, William Cuthbert, and John Ker, citizens of Inverness, Nigel Mack-comil, vic niel, servant of the said Ronald, Donald

* Same MS. Collection of M'Farlane, i. p. 236. † Ibid. i. p. 244.

[a] Robertson's Scotland, I. p. 15, 17.

quences of a partition of the vanquished territory. When the northern chief portioned out his new acquisitions, he would naturally bestow them in the first instance on such of his followers as were allied to him by blood; and the subdivisions by these again, to their children and cadets, would in time beget the idea of universal consanguinity. The Aborigines becoming incorporated with the new settlers, transferred to *their* ruler the attachment formerly paid to their own, whilst they assumed his name;[a] and thus "regarded as the superior of their lands, and the chief of their blood," the mandates of the leader were the sole rule of governance for the entire sept; whose sublimest degree of virtue it was, to love their lord, and pay him a blind obedience.[b] No insult was so poignant to a clansman as to bid him name his chief;[c] a defiance amounting to insinuated ignorance of his authority. That this is a true picture of clan policy,

Dumak hamish vic Alister of Badenoch, and John Gibson, notary public.

* On 19th November, 1597, M'Intosh and Kenneth M'Kenzie of Kintail associated themselves, by a strict league, followed by oath, for themselves and their posterity, against all mortals—the Queen's Majesty excepted.

An alliance has subsisted for some hundred years between Macleod of Rasaay and M'Donald of Sky, in consequence of which the survivor always inherits the arms of the deceased. The author has been informed, that on the death of the late Lord M'Donald, his brother and successor presented a superb sword to the present Rasaay, an officer in the 78th Highlanders.

* Same MS. Collection of M'Farlane, i. p. 252.

[a] Gartmore MS. Birt's Letters, II. p. 363.

[b] Birt, II. 22. [c] Ibid. II. 117.

has been admitted by every writer ;[a] and the statute 1587[b] which compelled the heads of tribes to find security for the outrages of their adherents, virtually legalized the authority of the chiefs by acknowledging their supreme control. Thus the members of every clan were united by a double bond of feudal superiority and patriarchal attachment.[c] They were the vassals of the chief; but he was also their father; and the indissolubility of the connection was in no small degree aided by the custom of *fosterage*.[d] By this singular rite, children were mutually given from one class to another, to be nursed and reared by strangers; and the young noble ever after looked upon the peasant sons of his foster-mother with the affection of a beloved relative.[e] It became also a leading maxim, that the clan, from the highest to the lowest, composed but one family, bearing the same name, and sprung from one common ancestor.[f] These notions were countenanced by the *patronymic* of that ancestor, being adopted as the distinguishing appellation of the sept ;[g] and the state of England on the Nor-

[a] Johnson's Journey, Works, VIII. 314. Dalrymple's Memoirs of Great Britain.

[b] Statute 11th, Parl. Ja. VI.

[c] Grant's Essays, I. 17.

[d] On this subject see Johnson's Works, VIII. 378. Mrs. Grant's Essays, II. p. 193. [e] Cambden.

[f] Quarterly Review, XIV. p. 300.

[g] The *patronymic*, or "epithet expressive of the chief's patriarchal dignity as head of the clan," was derived from the founder of his race, from armorial distinctions, or the memory of some great feat. The custom seems another evidence of *Teutonic* ascendency

man conquest, bears no inapt comparison to that presented by the Highlands but a century ago. "The realm of England," says Maddox,[a] "was deemed one great seignory or domain, of which the King was Sovereign Lord, having under him many barons or great lords, and many knights and military tenents, besides socagers, burgesses, and others. In order to survey the court of this chief lord, we may consider him as residing in his palace, and surrounded by his barons and officers of state. The baronage attending on his person made a considerable part of his court: they held their baronies of him: he was their sovereign; and they were his men as to life, limb, and earthly honour." So the Highland chief, as he was the original proprietor of the land,[b] had paramount authority over the whole clan, which again was split into branches from the main stock, having their own chieftains; whilst these were subdivided into smaller ramifications,[c] who deduced their original from their

in our mountains. In Iceland (I have been assured) it has always been, and is yet, the practice to adopt the *Christian* name of the father, as the *sirname* of the son; so the Duke of Argyle was called in the Highlands, *Mac-Callanmor*, or the son of *Colin* the Great. The progenitor of the Campbells, it is well known, was an Anglo-Norman, who married the *Celtic* heiress of Argyll. (Caledonia, I. 597.) Besides his patronymic, the leader had also an inferior title, characteristic of his stature, complexion, habit, or the like; as (see Notes to the Lady of the Lake, Canto II. p. 322) thus: *Rob Roy*, Red Robert; *Roderigh vich Alpine Dhu*, Black Roderick the descendant of Alpine.

[a] Exch. Hist. c. 1. sect. 2. [b] Johnson's Works, VIII. 314.

[c] Birt's Letters, II. p. 2. Wade's Memorial, Appendix to ditto, 271.

particular leaders, and relied on them for protection and defence.

The notion of a body-politic, with an acknowledged authority over every individual of the state, was little recognised among the Gaelic people.[a] The situation of each tribe in a rude and inaccessible country, nursed this principle of disunion into a high and daring spirit of independent sovereignty. It may not be uninteresting to view the social system displayed in the internal government of a clan. It exhibits a total absence of any democratic influence, to diminish the sway of the chief; and represents him as sole lord and governor of his people.[b] Innumerable authorities establish this position;[c] which is strongly illustrated by an anecdote of a Highland laird, who remarked, upon one of his vassals complaining of some slight injury,[d]— "that had any of those people formerly said as much to their chief, they would have been carried to the next rock and precipitated." We need add little to the picture of the blood-thirsty cruelties of the noted Lord Lovat.[e] In addition to the published atrocities of which this man was guilty, he, on one occasion, sent a party of his clan to murder Fraser of Struy. The

[a] Caledonia, I. 454.

[b] "Kings can for the most part only exalt or degrade. The *Laird* can at pleasure feed or starve, can give bread or withhold it."—Johnson's Works, VIII. 314.

[c] Quarterly Review, XIV. 292. Birt's Letters, II. 3, 4, 152.

[d] Ibid. II. 22.

[e] Historical Account of Frasers, 4to. p. 157.

villains encountered him in the mountains; but being a person of address, he persuaded them to accompany him to his house, where he contrived to intoxicate them, and escaped. On another occasion, some of his emissaries received orders to set fire during the night to a gentleman's house in Ross. They, more compassionate than their leader, apprized the destined victim; and loss of life was not added to their guilt. Chisholm of Chisholm possessed qualities little inferior to Lord Lovat himself. A man of strict integrity, he thwarted many of his Lordship's schemes; and, being at the head of a powerful tribe, was safe from any open violence. Chisholm having on one occasion to go to Inverness, and Lovat knowing that the evening would be far advanced before his return, had a deep trench cut in the highway, in the hope his detested rival would fall into it; but Chisholm being an expert rider, and well mounted, his horse cleared the ditch, and saved him from the bloodhounds who were lying in wait for him. The instances of houghing cattle, and burning barn yards by Lovat's banditti, are too well known to require any mention. And who, in reading these details, can coincide in opinion with a late writer, that a Highland chief was not despotic?[a] Even the elective franchise of *tanistry* was but the momentary ebullition of clan passions aroused by circum-

[a] Jameson's Introd. to Birt's Letters, I. lvii.

stances! The most passive will at times rebel; and this law provoked revolution and civil war by its very principle.[a] But whatever change was effected in the condition of the governor, there was none in that of the governed. They merely substituted one master for another, without counterbalancing the evils of the ancient misrule. They remained divested of a voice in the chief's councils as before, and sought to veil all remembrance of their disloyalty by transferring their affections and allegiance to the newly elected superior, whom they held up as the lineal representative of an hereditary authority.[b]

In a Highland clan, society partook of a three-fold division, into chief, tacksmen, and people.[c] The first was the supreme dispenser of all power. He made war or peace, concluded alliances, and entered into treaties with other tribes. His collateral relations, or those nearly allied to them, formed the second class. These held considerable farms from their superior in tack, or wadset, and received the name of tacksmen. For many ages such possessions were hereditary, and the rentaller was distinguished by the name of the place where he resided. To support his rank, the tacksman parcelled out his peculiar district into small portions, which he

[a] Ware's Antiq. and Hist. of Ireland, c. 8. Dr. M'Pherson's Dissertation on Caledonians, p. 166.

[b] Quarterly Review, No. XIV. p. 300.

[c] Johnson's Journey,—Works, VIII.

let to the commoners of the clan.[a] Thus the tacksmen held an intermediate station, and might be deemed the aristocracy, the relations of the

[a] Minorities being of frequent occurrence from long continued feuds, the education of the young chief, and the direction of his affairs, fell to his *Tuit-fhear*, or guardian uncle. Such an event added to the dignity of this kinsman; for without derogating from the eulogiums which have been bestowed on these persons in Highland history for their blameless integrity, the gift of the ward and non-entry duties due to the crown, which they generally contrived to acquire, gave them the means of increasing their state. By a circumspect alienation of these till the laird's majority, they swelled the list of their retainers, and even enrolled rival lairds or tacksmen in their train. Thus, in a contract and bond of manrent between Thomas Fraser of Knockie, wardator of the Lordship of Lovat, and James Fraser *in* Belladrum, brother german to Huteheon Fraser of Guisachan, dated 2d December, 1578, James Fraser,* in consideration of a grant of the ward, and non-entry duties of Belladrum, pays down "ane grait sum of money extending to the sum of L.50, 6s. 8d. usual monie of this realme," "and binds and oblidges him, his heirs, &c. leally and truely be ye faith and truth of his bodie, till tak trew effald and plain part wi ye said Thomas and his Airs, and till assist, serve, fortify, maintain, and defend wi the said James' haill tenants of the haill forsaid lands the said Thomas in all his just, leisome, and honest actions, causes, adoes, and effeiris at his charges, thairof both in *hosting* and *hunting*, and in the King's wars, and in the *brogh* (borough?) of *Inverness*, and in the hielands, upon their ain expences, and also in sick friendis actionis as ye said Thomas sall be requiret and desired till, ye said James and his servands with him being upon the said Thomas' expences *only gif* they pass furder nar ye bounds at Aldearn, or *thairabouts*, and sicklike in all uther places, as the said James sall be requirit be the said Thomas upon his expences against all deadly, *ye autority* and *ye Lord Lovat* in all his knawn, just, honest, and leasing actions, adoes, and affairs *only* excepted; and till cum himself and his tenantis of the said landis to the said Thomas' Court or Courts at sick tyme and place within the bounds of the Barony of Lovatt as they sall be requirit

* Penes Mr. Fraser of Belladrum.

regal and plebeian orders being connected through them; and whilst they owed suit and service to their superior, they, as chieftains of inferior authority, exacted similar tribute from their respective dependants. The principle of subordination was in this way universal; but the idea of a common affinity tempered in some degree the errors of such a system by a mutual exchange of benefits and affectionate returns.[a] It was a solitary check, it is true, but perhaps a very forcible one, at a period when the relations of domestic life were of stronger hold than at present; and not without reason may we partly ascribe to this belief of *gentle birth*, that polish in address and sentiment, which every one, who knows them, will admit the Highland peasantry to be possessed of. For indisputably many of the lower orders do at this moment reckon among them the descendants of the sons of tacksmen who had fallen into the common herd, either by their portion having been reassumed by the laird into his own hands, or by those descendants sinking into poverty, brought about by an excessive population, and consequent dis-

thairto, for haning and sparing and keeping of woods, and deer, and staying of slaying of salmonds and black fishes, and for following furth of guid order, punishing of thieves and trespassers, and maintaining of quietness within the said Lordship." In the event of delinquency, James agrees to be tried for his offences before his Judge Ordinary, or a jury of Frasers there named, ("as the said Thomas sall please best,") provided always, "that against them the said Thomas sall not have action at the time of that trial!!"

[a] Mrs. Grant's Essays, II. 116, 167.

inclination to labour.[a] And as others of those tacksmen's sons found an outlet in the French and Spanish armies, where they perhaps rose to distinction, those at home, however much lowered in circumstances, deemed it incumbent on them to remember their own high descent, and that they also were—Gentlemen! Where is the proprietor in the Highlands who has not numbers of these poor cousins? But no inconsiderable degree of that refinement, which distinguishes the conversation of these mountaineers, may be attributed to the influence of poetry so ancient and so universal; to the little courtesies which necessity compelled them to pay each other when they removed in the summer months to their distant *shealings*; or when in winter they crowded around the blazing hearth, to join in the dance, or listen to the song.[b] The rustic of the south repairs, when his labour is done, to the alehouse, there to drown his cares in low debauchery; but the Highland peasant could betake himself to no such rendezvous. Beyond his glen and mountain side, the world had for him no charms. Cattle constituted all his wealth: in driving these from place to place, or bringing them down from the heights, numerous opportunities were afforded to neighbours of conferring acts of kindness. Destitute of books, unvisited by strangers, the resources against ennui

[a] Appendix to Birt's Letters, II. 340, 341.
[b] Mrs. Grant's Essays, I. 20, 198. II. p. 7.

lay among themselves; and the belief of a common ancestry gave rise to a warmth of feeling, which can exist only in a domestic circle. To other septs the Highlander was rude and lawless; but gentle and affectionate to his own. "Every man was a soldier who partook of national confidence, and interested himself in national honour."[a] Last not least effectual, in producing civility of speech, was the character of the government; which being regal, diffused politeness from the laird throughout the clan.[b]

I have thus endeavoured to pourtray some of the results attending the amalgamation of the feudal and patriarchal systems. It were a trite observation at this day, to remark that any such union, was fit only for a rude state of society, and had a tendency to repress every attempt at liberty.[c] Let any one, who has considered the nature of the *mercheta mulierum*, the avail of marriage, and the wardship of heirs,—say what the condition of the lower ranks could have been, but that of a degraded and enthralled people? As the land was, in almost every instance, the chief's, the barbarous nature of the feudal customs considered the possession of the vassal or tenant as that of the landlord, and authorized the seisure of his goods for his superior's debt.[d]

[a] Johnson's Works, VIII. 322. 240.

[b] L'Esprit des Loix, liv. iv. c. 2.

[c] See L'Esprit des Loix throughout. Robertson's State of Society, p. 21.

[d] Erskine's Institute, b. iii. tit. vi. sect. 22.

Indefeisible hereditary right, and absolute uncontrollable sovereignty in the chief magistrate,[a] —those monstrous absurdities,—were taught as essential. The mischief of such maxims, the crimes they gave rise to, by the power which they threw into the hands of the chief, continued to agitate the Highlands for a long series of ages. Add to these, the almost universal ignorance which prevailed; the absurdity of their superstitions,[b] and the harsh and unchristian feelings with which the natives pursued the gratification of private pique, or public hate; and we have a picture which we almost shudder to contemplate.

That picture glows in full force even when we turn to the days of our James I. In the stormy era which preceded that reign, we cannot suppose its shadows were less prominent; unless, indeed, we could imagine with Dr. MacCulloch,[c] that the condition of the lords of the west and their retainers during their subjection to the Norwegian rule, was ameliorated by the wholesome laws which this people everywhere established; and that the dismemberment of the western coast from the Norsemen, was the signal for the dispersion of lawless troops of marauders; who then, uniting under different leaders, gave

[a] Gartmore MS. App. Birt's Letters, 366. MacCulloch, 451.

[b] Moral Statistics of the Highlands, by the Inverness Education Society, 1826, p. 8, 9.

[c] Letters on Western Isles, IV. p. 434. 400.

rise to fresh clans, and laid the foundation of new families.

As in order fully to comprehend the aspect, under which a nation appears at a distinct period of their history, it is necessary to have a knowledge of the events by which society was conducted to that point, I shall perhaps best attain the object of this essay by throwing the scattered notices of my subject into one general view, comprehending the prominent features of the Highland character preceding the year 1745.

As connected with the power of the magistrate, of which I have treated, the administration of justice is of primary importance. In this particular, our Irish progenitors were remarkably deficient. The chief who governed them was also their judge; his will, or that of his *Brehon's*, the only rule of law;[a] and the office of the *Brehon* was hereditary. He held his Courts on a motehill, or mound of earth;—a form of judicature, in which we discern a remarkable similarity between the Celtic and northern nations: from the *Brehon* to the *Baron Bailie* of more modern times, the transition was easy. As robbery was attended with no degree of infamy among the ancient Germans, if exercised beyond the limits of their own community,[b] neither was it among the Highlanders.[c]

[a] Caledonia, I. 308. [b] Cæsar.
[c] Graham's Sketches of Perthshire, p. 97.

It seems to have been considered a laudable custom, and one wherein the youth, (sworn upon their *dirks* to be true and loyal to their commander,[a]) were trained to hardihood and military exercises.[b] But it was (if we may use the expression) on a nobler scale than the depredations of our days: private theft, in fact, was hardly known; and a sheepstealer was looked upon with contempt.[c] Their *creaghs*, or forays, were headed by the younger sons of the tacksmen, and often by the chief himself: always, indeed, when for the first time he assumed command of his clan; and from the spoils of such incursions into the Lowlands, not inaptly styled "Michaelmas moons," the chief's daughters were portioned off, or his followers soothed for occasional acts of despotism:[d] money he had not to give them, and a batch of cows was the substitute. A rich maiden had from ten to forty; two cows were however a decent portion.[e] If in these raids the injured party dis-

[a] "Captain Fraser took the oaths of fidelity of such gentlemen of his name as he suspected, and they and the men were *sworn upon their dirks* never to desert him."*

[b] Pennant, 3d vol.

[c] Birt, II. 131. Lady of the Lake, notes, p. 400.

[d] Quarterly Review, XIV. p. 296, 298.

[e] Johnson's Works, VIII. 339.

In 1649, MacLean of Duart married his sister Fingula to MacLean of Col, with a hundred and eighty kine, and stipulated if she became a widow her jointure should be 360!

* Trial of Captain Simon Fraser of Beaufort, 6th September, 1698.—Justiciary Records, and Arnot's Criminal Trials, 79.

covered the track of the "lifted" cattle, and overtook the aggressors, matters were generally compromised by the chief making a composition ;[a] and this was conformable to their *Brehon* system, by which all crimes were commuted ;[b] but if captured, the robbers seldom betrayed the name of their protector :[c] he who did so, and received *tascal* money as informer, met scorn, perhaps death.[d] To purchase security from these spoilers, it became customary to enter into compacts with their leaders ; by which the latter agreed for a determinate annual sum to protect the contracting party's lands and property. This tribute received the appellation of *black mail*, and regular receipts were granted for its amount.

These predatory incursions served to diffuse a martial spirit through the clans, rendering them averse to constant hard labour and a settled life. The commonalty were wretchedly lodged,—wretchedly fed ; and knew no more of the improvements of life than the breeding of cattle, and the making of hay, butter, and cheese.[e] Devoted to their chiefs they were ready, when the "fiery cross" circulated, to brave every danger ; whilst the lightness of their habit, and the wandering nature of their avocations in the mountains, made them superior to fatigue, and indifferent to the inclemency of the weather. Wrap-

[a] Hist. of Sutherland, 57. Birt, II. 130.
[b] M'Pherson's Dissertations on Caledonians, 170.
[c] Mémoires de la Vie du Lord Lovat, 78.
[d] Birt, II. 142. [e] Gartmore MS.

ped in his plaid, which he soaked in some neighbouring brook, the peasant felt a warmth from the steam, that enabled him to brave the most pitiless storm.[a] It might have been expected that he would have been as slightly armed as he was clad: on the contrary, when in full costume, the Highlander encumbered himself with a claymore, or great two-handed sword,[b] a target, a brace of pistols, a dirk, a gun, and a *skeandhu*, or small hunting knife placed in the garter of his right leg: Captain Birt compares a man thus accoutred to a whole company of foot.[c] Yet an acute observer was not able to discover that the art of defence was any part of common education: the gentlemen were sometimes skilful swordsmen; but the common men had no other powers, than those of personal courage and violence.[d] To the serious turn of mind inspired by

[a] Birt, II. 16.

[b] Meyrick's Ancient Armour, 358. Johnson's Works, VIII. 351. Birt.

[c] Letters, II. 119.

[d] Johnson's Works, VIII. 352.

The singularity of the Highland garb and arms was not lost upon the author of "Memoirs of a Cavalier from the year 1632 to 1648." In describing the Scottish army, he says:—

"I confess the soldiers made a most uncouth figure, especially the *Highlanders*. They were generally tall swinging fellows; their swords were extravagantly, and I think insignificantly broad, and they carried great wooden targets, large enough to cover the upper part of their bodies. Their dress was as antique as the rest; a cap on their heads, called by them a bonnet, long hanging sleeves behind, and their doublet, breeches and stockings, stripped across red and yellow, with short cloaks of the same. These fellows looked, when drawn out, like a regiment of merry Andrews ready for Bartholomew Fair. They are in companies of all of a name; and therefore call one another only by their Christian names, as

the magnificent scenes of nature, and the indistinct appearance of objects under a varying atmosphere, may be ascribed the tinge of superstition which marked the national character. The *Taishitaraugh*, or second sight;[a] the witches, the goblins, and the wild train of tutelary and local spirits, are proofs of the poetical and enthusiastic temperament of a mountain people. The love of such a people for their native land was indelible, and it was exemplified in the new-married bride spinning the winding sheet, which was to cover her, when she lay among her fathers. At their marriages and funerals, to which a generous hospitality made every one welcome, without a question as to name or lineage,[b] mirth prevailed to an almost incredible degree. Each clan possessing separate and distinct interests,

Jemmy, Jockey, and Sawney, that is, *Alexander*. They scorn to be commanded but by one of their own clan or family. They are all gentlemen, and proud enough to be kings. The meanest fellow among them is as tenacious of his honour as the best nobleman in the country; and they will fight, and cut one another's throats for every trifling affront. But to their own clans or lairds they are the willingest and most obedient fellows in nature. Give them their due, were their skill in exercises and discipline proportioned to their courage, they would make the bravest soldiers in the world. They are large bodies and prodigiously strong; and two qualities they have above other nations, viz. hardy to endure hunger, cold, and hardships, and wonderfully swift of foot. The latter is such an advantage in the field, that I know none like it; for if they conquer, no enemy can escape them; and if they run, even the horse can hardly overtake them. There were some of them who, as I observed before, went out in parties with their horse." pp. 156, 2.

[a] Martin, Western Isles, 300 et seq.

[b] Notes to Lady of the Lake, p. 307.

and therefore necessitated to provide for internal union, intermarried with one another.[a] With the chief it was an object of policy to seek additional strength by powerful alliances with his equals:[b] His household was numerous;[c] a select body-guard, called *Luicht-tach*, defended his person; and his visits were paid with much pomp. Independent of his gardes-de-corp, he was accompanied by his *henchman* or secretary; his bard; his *bladier*, or spokesman; *gillie-mòr*, or sword-bearer; *gillie-casflue*, carrier over fords; *gillie-comstraine*, leader of his horse; *gillie-trushanarinsh*, baggage man: Next came the piper, and then the piper's attendant. Of convenience or magnificence his dwelling had little to boast: the most ancient fortalices being single square towers, four or five storeys high, each comprising but one room.[d] The top con-

[a] When a couple were united, their friends sent them presents to fit them out, such as table linen, meal, cattle, and the like; and persons even of genteel birth did not disdain to receive such gifts. Sometimes the young people made the round of their relatives and neighbours to try fortune's smiles. This was called *Thigging*.* Many of our young ladies would stare to be told that in this manner were their grandmothers launched into the world. "It was also anciently customary in the Highlands to bring the bride to the house of the husband; nay, in some cases, complaisance was stretched so far, that she remained there upon trial for a twelvemonth, and the bridegroom even after this period of cohabitation retained an option of refusing to fulfil his engagement."† Hence deadly feuds arose.

Mrs. Grant's Essays, I. 48.

[b] Birt, II. p. 114. [c] Ibid. 61. Lady of the Lake, p. 358.

[d] Cardonell's Antiquities, 8.

* Birt, II. 106. † Lord of the Isles, p. 387.

sisted of a sharp-roofed warder's turret, encompassed by battlements; in the second storey was the principal chamber or hall; and below these, the dungeon and guard-room. Built solely for safety, such habitations answered every purpose of the owner, if they secured his family and dependants (nay, occasionally his cattle) from the assaults of an enemy. The famous Lord Lovat of 1745, kennelled 400 persons in his rude retreat![a] In the days of Birt, the chiefs had generally exchanged these incommodious fastnesses for houses built sometimes of stone and lime.[b] These were, however, far removed from the ideas of modern times; since it appears that if they were of two storeys they were, *par excellence*, styled "*lofted* houses;" whilst stone dwellings were so rare, as never to be seen in the interior of the mountains. The gentlemen of the clan were little better off in point of outward accommodation, than their vassals. They both lived in huts.[c] These had several gradations from "murky dens to commodious dwellings." They were built (and the peasant's hovel is so still) without mortar, either of turf or loose stones: The meanest had two rooms; the first lighted by the entrance; the second by a lateral apology for a window. The fire-place stood in the centre, and to economize the heated air, there was seldom even a smoke hole. But several of the huts, inhabited by superior people, had walls cemented by mor-

[a] Historical Account of Frasers, 156. [b] Birt, II. 101.
[c] Birt, II. 7. Johnson's Works, VIII. 334.

tar, glass windows, and boarded floors: Entering one of them belonging to a gentleman, Captain Birt found it, like the others, undivided by any partition; the family at one end, the cattle at the other; the host was without shoes, stockings, or breeches, in a short coat, with a shirt not much longer, and his two daughters sitting beside him. In the course of conversation with aged persons in the Highlands, the author has been assured by them, that, where many of the modern elegant mansion houses of heads of tribes now stand, their fathers resided in poor "bothies." Yet the provisions of life were in abundance: of butcher meat there was ample store; whilst his hills afforded the chieftain every variety of game, and his rivers the most wholesome fish. Many were provident to barter the latter with French merchants, receiving in return spiceries, and other delicacies.[a] A Highland laird, with a rental of perhaps not more than L.300 or L.400 per annum, kept up a state equal, if not greater than many sovereign princes of Germany at this day; whilst the pride of birth, and the sense of real or affected superiority, were cherished by the compositions of the bards, in which they extolled the exploits of his ancestors, or the dazzling qualities of his own character. The passion of fame, by exciting a spirit of emulation, led the inferior orders to copy their leader; and it will not excite surprise, that the bards, who

[a] Historical Account of Frasers, 102, 4to.

were placed, by the Celtic nations, beside the husbandman and artisan, as one of the three pillars of social existence,[a] should on their office becoming hereditary, assume an insolent and overbearing deportment. The blind respect paid to their persons, and the ample privileges conferred on them, by exciting the passions of a vain race of men, paved the way to their total decline; and, as letters were diffused, the Order sunk into contempt.[b] We may not, perhaps, go the length of acceding to Dr. Johnson's axiom, and argue, that because a man cannot read he cannot compose; on the contrary, we well know that many nations of antiquity couched their laws and historical monuments in verse, which were handed down by tradition; yet it seems but common sense to say, that all such compositions must partake of the intellectual debasement of the times. As the circle of their knowledge was narrow, the ideas of the bards must have been confined in proportion.[c] Hence the objections, which have been raised, to the authenticity of the poems of Ossian; founded on the inconsistency of appropriating civilized and benevolent feelings to a savage state of society, on the want of *costume*, and the striking inaccuracies in chronology. Into the merits of this celebrated controversy, I do not pretend to enter. That the Highlanders possessed traditionary

[a] Thierry, Histoire de la Conquête de l'Angleterre, I. 99.
[b] Lord of the Isles, note, p. 385, and Martin's Western Isles.
[c] Dissertation on the Poems of Ossian, 351.

songs and tales containing much of wild and beautiful imagery, it were vain to deny;[a] but, whether the poems in point have anywise influenced the national character, is another question. The leading traits of most nations are preserved in their poetry, which again may be said of itself to mould the public taste; the generous contempt of death, the wild and animated measure of the Runic ryhmes, characterize the earlier Gothic people, whilst yet in a primitive state of society: In the lyric poetry of Spain, we discern that union of courage and love, that harmonious combination of gallantry and tenderness, so expressive of the chivalrous bearing of Moor and of Spaniard. To those exquisite compositions, which have preserved, with all the

[a] This is proved by the preface written by John Carsewell, bishop of the isles, to his "*Foirm na Nurrnuidheabh*, or Forms of Prayer," printed at Edinburgh, (called on the title-page both *Dunedin* and Dun-*Monaidh*, *i. e.* City of the Moors) 24 April, 1567. The only complete copy of this singular work is in the possession of the Duke of Argyle; but an extract from it will be found in the Scottish Descriptive Poems, edited by the lamented Leyden, p. 215. "We never had in print," says the bishop, "the history of antiquity, or of our ancestors, although a certain portion of the literature of the Gaels of Scotland and Ireland exists in manuscripts in the possession of bards and teachers, and their patrons. Great is the sinful darkness, and ignorance, and perverseness of those who teach, and write, and compose in Gaelic, in exhibiting much more attention, and showing more anxiety to preserve the vain, extravagant, *false*, and worldly histories of the Tuath-de-Danans and Milesians, and of the heroes of Fingal the son of Cumhail of the Fingalians, and many others which I shall not here mention, than they display to write, and to teach, and compose the sincere words of God."—See on this subject the notes to Sir Walter Scott's "Lord of the Isles."

freshness of nature, the manners of the Moriscoes and Shepherds, and the exploits of the Cid, must we look for the source of that tone of romance displayed in the Spanish character. With us the poems of Ossian were as a dead letter, till within the last forty or fifty years; and it is certainly a surprising fact, that compositions, replete with delicacy of sentiment, and the most elevated heroism, should have lingered for ages unknown, till the industry of M'Pherson gathered them together!

Music or song is found coeval with society among the most barbarous nations.[a] Critics have considered music and poetry as sister arts; and it seems credible that the exquisite melodies, which still remain in the Highlands, have been handed down from our Gaelic progenitors.[b] Mountaineers cling with affection to the customs of their ancestors; and, if there be any thing which may escape shipwreck by traditionary descent in the mutations of time, we may say it is melody. Thus, the simple and affecting airs of the Scottish Highlanders would pass from one generation to another, unaffected by those revolutions which language, whether in verse or prose, must undergo. How the loud drone of the bagpipe should have superseded the once universal and melodious harp, is matter of curi-

[a] Blair's Dissertation on Ossian.

[b] See Captain Fraser's Highland Melodies, and the act of 6 James VI. c. 98. enjoining a knowledge of music.

ous but unsatisfactory conjecture.[a] But "for the blast of war," the great Highland pipe is well adapted; and the Highland soldier has evinced in many a hard fought field, the inspiring influence of

> "Those thrilling sounds, that call the might
> Of old clan-Alpine to the fight."

We may now advance to a consideration of the political aspect of the Highlands.

The dawn of history presents the tribes of the isles and western shores, yielding obedience to the Scandinavian Sea-kings and their successors, the lords of the isles; whilst the inland clansmen maintained a perpetual conflict with the Flemings and Saxon colonists of the Lowlands. Their subjection to the Scottish crown was merely nominal.[b] Although the treaty entered into in 1266, transferred from the Norwegian monarch[c] the possession of the Hebridean isles, and the laws of Scotland were in future to prevail over the ceded territory; the powerful dynasty of the CLAN-COLLA, lords of the isles, ruled, with supreme authority, over the western

[a] See notes to the Lady of the Lake, p. 307-8. and Dr. Beattie's Essay on Laughter and Ludicrous Composition, cap. iii.

[b] Mrs. Grant's Essays, I. p. 27.

Of this we have a remarkable proof in the defiance and defeat of Alexander II. by a freebooter called Gillescop, A.D. 1228, and not until he had routed his sovereign, burnt the town of Inverness, and several wooden castles in Moray, and slain a baron, (one Thomas Thirlstane) was the Earl of Buchan enabled to subdue this savage. (Fordun, ix. c. 47.)

[c] Torfæus, IV. 343.

islands, the greater part of Inverness-shire, and the whole of Ross, till the accession of the Stewarts. The reign of Robert the Bruce, as it was distinguished by important revolutions, may be said to be the first, in which any impression was effected on the power of the Highland chiefs. John Cumine, lord of Badenoch, was regarded by the king as a competitor for the throne; and the mortal consequences of their interview at Dumfries,[a] aroused his adherents to revenge. Many of the most eminent of the Highland chieftains, especially of the western clans, joined the confederacy; and the "broach of Lorne," long preserved by one of their heads, bore witness to the personal danger of the monarch. The success of Bruce involved his opponents in ruin: nearly half of the lands in the kingdom became escheated to the crown; while new and subordinate families rose to wealth and eminence on the downfall of the ancient houses. Low country barons now gained a footing in the mountains:[b] but whatever benefits might have accrued from the settlement of these strangers, were rendered nugatory by the feeble administrations of David II. and Robert III. A protracted struggle for national independence, the successive flight, imprisonment, and redemption of the son of Bruce,[c] prevented an inquiry into

[a] M. Westminster, 455.

[b] Robertson's Index to Charters.

[c] Buchanan, b. ix. M'Kenzie's Lives of Eminent Authors, II. 91. Rymer's Fœdera, V. 793. VI. 46, 52.

the internal policy of the Highlands by the government; whilst, amid the general distress, the exaltation of the powerful family of Douglas threatened to dissolve what little of political union remained.[a] We find, indeed, that in the national council held by Robert II. in April 1385, John, earl of Carrick, was ordered to proceed to the Highlands, and call the chiefs into his presence to reform the outrages complained of in their territories;[b] but it does not appear his mission was productive of much effect. The commencement of Robert III.'s reign, was marked by an event strikingly illustrative of the inefficacy of the laws, and of the turbulence of the times. Alexander, fourth son of Robert II. justly denominated the "*Wolf of Badenoch*," collected his Highlanders in revenge for the sentence of excommunication denounced against him by the Bishop of Moray, and set fire to the cathedral of Elgin, and the houses of the clergy.[c] Too mild to punish, the king dared not even to complain. From the long captivity of his successor, and the character of the regents, Robert and Murdoch, Dukes of Albany, universal anarchy arose. The prerogatives of the Crown, naturally inconsiderable, were reduced to nothing; the spoils of the monarchy shared by a dissolute nobility;[d] whilst the weak, oppressed by the powerful, appealed to justice in vain. Donald,

[a] Robertson's Scotland, I. 21. [b] Pinkerton, I. 28.
[c] Shaw's Moray, 276. Pinkerton, I. 47.
[d] Innes's Critical Essay, I. 272.

Lord of the Isles, laying claim to the earldom of Ross, led a numerous army of Hebrideans to the eastern coast, with the intent of sacking Aberdeen; and burnt, on his destructive march, the greatest part of the town of Inverness.[a] Alexander Stuart, Earl of Mar, encountered the island chieftain at Harlaw, and defeated him on the 24th July, 1411. From this reverse, we may date the decline of the *Clan-Colla:* The castle of Dingwall, the seat of their power, fell into the regent's hands, and the territory of Ross was annexed to the Crown. James I. returned to guide the councils of a distracted country in 1424. Wherever he bent his steps, he found the regal authority held in contempt, or circumscribed by the usurpations of the aristocracy. A people accustomed to the license of the loose and delegated jurisdiction of a regent, were inspired with respect for the measures of a sovereign as vigorous as they were wise.[b] Murdoch and his sons paid the penalty of their crimes; and the nobility were taught submission, by the severity of wholesome laws. A parliament held in 1426, ordered every lord beyond the Grampians to repair to his castle, there to govern his district, and expend his revenues. To repress the lawless acts of the Highland reguli, and, in particular, to crush the rebellious spirit of the lords of the isles, James repaired in person to Inverness in 1427.[c]

[a] Historical Account of Frasers, 57, 4to.

[b] Robertson's Scotland, I. 30. Caledonia, I. 829.

[c] Martial Achievements, II. 279.

Fifty of the principal heads of clans were arrested; Alexander, lord of the isles, and his mother, thrown into captivity, and their adherents reduced to obedience.[a] But the mountain torrent was too powerful to be repressed by a solitary check: The island chief rose in arms, and burnt the town of Inverness; and the king, again compelled to chastise his unruly subject, overtook his forces, and totally defeated them in Lochaber, 23d June, 1429. By the unreserved submission of the vanquished prince in the church of Holyrood, the execution of Donald Baloch's followers,[b] and the death of Baloch himself, the most fatal check was given to the dynasty of the isles which they had received since the conflict of Harlaw. The efforts of James II.[c] directed to the humbling of the overbearing ambition of the Douglasses, and other potent barons, afforded little leisure for the consideration of what was passing in the mountains; and the silence of history bears the surest testimony to the salutary effects of his predecessor's policy. A period of nearly forty years elapsed from their subjection by James I. before we again hear of the lords of the isles. In that time they had recovered from their alarm; and, in 1462, during the reign of James III. we find John of Ilay, Earl of Ross, and lord of the isles, entering into a negotiation with Edward IV. of England, on the independent footing of a sovereign prince. On

[a] Pinkerton, I. 119. [b] Bower.
[c] Robertson, I. 33.

the 8th of February that year, he became Edward's liegeman, and did homage for himself and his people. It was stipulated by the treaty, that if Scotland was vanquished by their alliance, all the country to the north of the Forth should be bestowed on Ross.[a] But this step proved fatal to his ambitious projects; for the agreement with the English monarch coming to light in 1474, vigorous measures were directed against him for his treasonable practices; sentence of forfeiture pronounced,[b] and a force assembled to carry it into execution: The rebellious Earl was stript of the earldom of Ross; which, with the castles of Nairn and Inverness, and the districts of Knapdale and Kintyre, were annexed to the Crown for ever.[c] The title of lord of the isles, as a lord of parliament alone, was confirmed to John de Isla, in consequence of his submission; and thus contracted in circumstances, and narrowed in authority, this family enjoyed a turbulent independence, till the forfeiture of the usurper Donald transferred their domains to the king.[d]

While a race long the rivals of the Scottish monarchs thus ceased to exist, the power of the latter remained as circumscribed as formerly. Though extremely solicitous of humbling the aristocracy, the progress made by our rulers was inconsiderable.[e] The main expedient they had recourse to, was the excitement of discord among

[a] Rymer, XI. 483, 484, 492.
[b] Rec. Parl. 195. 199. [c] Pinkerton, I. 285.
[d] A. D. 1504. [e] Robertson, I. 24.

the nobles; thereby hoping to annihilate the union of the order. But whilst individuals were thus sacrificed to the gratification of private resentment, the fluctuations of fortune brought fresh adventurers into their place; and this shallow device preserved unmitigated for ages, the seeds of discord and opposition to the throne. The conduct of government towards the Highlanders partook of this policy. The Brucean line of kings, by turning the swords of a more potent clan against an unruly adversary, hoped for his extinction; and they rewarded the service, by the possessions of the vanquished.[a] But this practice was productive of the continuance of the very evils it sought to subvert. Feuds necessarily became more prevalent than before;[b] and the monarchial part of the constitution, was yet further injured, by the enfeebling custom, of granting along with a tract of territory, the jurisdiction of a *free regality*. In these regalities, the decision of the lord was supreme, and the

[a] Fordun, II. 380. Caledonia, I. 820. Robertson, I. 24.

[b] Our national history is replete with instances of the rancour with which these hereditary quarrels were transmitted from parent to child. Lord Spainzie fell in a domestic broil of adverse branches of the Crawford family in 1607. (Stat. Account of Edzell, X. 102.) In the Inverness session records is this entry: "Upon ye frest of Junii, anno 1611, the shrff. of Murray was slain in Forres be robt. dunbar, son to ye guidman of Bkezie with ane pistolat shot throw ye thie." On 24th November, 1567, the Laird of Airth and the Laird of Wemyss met upon the High Street of Edinburgh, and togcther with their followers fought a bloody battle, "many on both sides being hurte by shote of pistoll."—Birrel's Diary.

privilege of *repledging*[a] removed the last shadow of dependence on the Crown. No wonder, then, if the difficulties which the Government had to struggle with, and the obstacles against order, were greater in Scotland than in any other country in Europe.[b] The Highlands, parcelled out among numerous shoots from the great family of Clan-Colla, from those of Norman ancestry, and those of mixed Lowland origin, must have become the theatre of savage combat. The reiterated theme of clan conflicts is the only one on which for many ages our writers touch; whilst foreigners speak with an air of pity and commiseration of "La sauvage Escoche."[c] In vain did a sta-

[a] The Baron who repledged, was obliged "to give caution of *Culrah* for administration of justice." See Register of Entails, Lib. 6. fo. 62, for Charters, dated 9th June, 1686, and 15th July, 1698, under the great seal, to George I. Earl of Cromarty. These charters gave the Earl power, if any of the indwellers and tenants of his lands should happen "to be arrested or attacked before *any judge or judges spiritual* or *temporal*, in any time coming, to *repledge* and call them back to the privilege and liberty of the said Court of Bailiery and Regality of Tarbat." For the definition of "caution of Culrach," the curious reader is referred to *Quon. Attach.* c. 8; *Jamieson's* Dictionary, *voce* "Repledge and Culreach," and Jamieson's Supplement, *voce* "Culreach;" *Skene, voce* "Colrach;" *Armstrong's* Gaelic Dictionary, *voce* "Cūl and Urras," and *Erskine's* Institutes, B. I. Tit. IV. § 8.

[b] Pinkerton, I. 147.

[c] Froissart, tom. IV.

The Vidame of Chartres, when a hostage of Edward VI. penetrated to the remote Highlands, (au fin fond des sauvages.) Perlin, a French author, who wrote a description of England and Scotland in 1558, thus pourtrays the latter country: "Prenons le cas que l'Angleterre soit Paris, l'Ecosse soit le faulx-bourgz, Sainct Marceau; la ville vault trop mieulx que les faulx-bourgz, aussi

tute of James II. ordain, "that the justices on the south side of the Scottish sea hold their courts of circuit twice in the year; and *in like manner on the north;*" in vain did a parliament assemble at Edinburgh, in the reign of James IV., to devise means for checking the islemen and Highlanders, "who had almost become savage;" justices and sheriffs were in vain appointed for the northern isles; ordered to hold courts at Inverness and Dingwall; and various districts allotted to the jurisdiction of Perth and Inverness, whilst a sheriff was created to rule over Caithness: —The evil was too powerful for the remedy.[a] Still the disorders of the clan system continued to call forth the exertions of the monarch, and the sagacity of the parliament. The vigorous understanding of James V. led him to imitate his predecessors, (but with greater constancy and success,) in humbling the nobles. He visited the Orkneys and the Hebrides,[b] and compelled the rude chieftains to acknowledge the offended majesty of the laws. But what little good was effected in one way, was done away with in another. The act 1581, by irritating,

vault trop mieulx l'Angleterre que l'Ecosse et n'y a poinct de proportion." "La plus part du pays est desert." And he congratulates Scotland for being favoured and caressed by the king of France, the greatest lord and monarch of all the earth! "O bienhereulx te doibs tu Estimer Royaulme d'Ecosse! d'être favorisé, nourry, entretenu comme l'Enfant en la mamelle, du tres puissant et magnanime roy de France, le plus grand seigneur de tout le monde, et monarque *futur de toute la machine ronde!!*

[a] Quarterly Review, XIV. 306. [b] Caledonia, I. 839.

rather than soothing the angry passions, called into play, in the disastrous reign of Mary, when the Highland clans espoused contending interests,[a] could be productive of nothing, but anarchy and civil war. Six years afterwards, a new enactment was set forth.[b] Seventeen border, and thirty-four Highland tribes are enumerated, whose leaders were commanded to give sureties for their behaviour, and were made answerable for their dependents. The repeated insurrections in after-reigns, make it manifest, from whatever cause, that the act was never enforced; and the political aspect of the Highlands when Charles I. mounted the throne, presents the power of the chief as absolute—the mass of the people as much benighted in darkness—as complete victims to discord and penury—as in the most distant and gloomy ages of the monarchy. But the consideration of this period requires I should look back on some minor details.

I may be thought to have attributed too generally the character of barbarism to the Highlanders. I by no means wish to do so. Many of the more powerful chiefs became attendants on the Court of the Scottish kings, and must necessarily have imbibed ideas of civilization; if at one time for the aggrandizement of the crown, at another, not less for their own emolument. The practice, partly voluntary, partly compulsatory, of sending their sons to the south, where

[a] Robertson, I. 174. [b] Stat. II. James VI. 95.

they might be initiated into the fashionable practices of the day, or placed under the surveillance of a friendly noble, as a surety for their parents' conduct, could not but conduce to a refinement of manners; and the memorable act of 1494, by which barons and freeholders were *compelled*, under heavy penalties, to put their eldest sons to school, to learn *Latin and law;* the alliances with France, and the custom generally prevalent of the elder sons of chieftains receiving their education in that country, were all so many conduits to the knowledge and politeness of the times. It was the extraordinary nature of their situation, which forced the Highland barons, men of education, into collision with the government; which also led them in the civil wars, to support, whilst they contemned, (strange paradox!) the regal prerogative; and which may account for our never finding them on the *popular* side of politics. Had they embraced *that* side, their own principles of unreserved obedience from the governed were at an end. Perhaps I am not wrong in saying, that a mixed sentiment of pity for majesty, and respect for their own authority, were the causes which contributed to the devoted loyalty of the Highlanders in the wars of Charles I.

Under Montrose, the military character of the Highlanders attained just renown.[a] The fame of his great name concentrated the discordant

[a] Montrose's Memoirs, 68.

elements of warfare, and enabled him to turn the martial bias of the clans, hitherto displayed in domestic feuds, to a proper field of action. His reception was enthusiastic, to a degree almost bordering on idolatry;[a] and he led his followers to a succession of rapid, and almost bloodless victories.[b] Indeed, of the remarkable incidents of Montrose's campaigns, not the least, is the small number of troops with which he engaged; and the astonishing disparity of the slain as compared to the enemy's. Thus, at the battle of Aldearn,[c] he only lost fifteen men, whilst 3000 of Urray's were killed: And when we consider that on this occasion, and especially at Inverlochy, Highlanders were opposed to Highlanders, the superiority of Montrose's soldiers must be looked upon, as the result of their entire confidence in their leader, joined to the abandonment of military habits by the Lowlanders and border clans, after the accession of James VI. to the English throne.[d] The inhabitants of the north of England, and south of Scotland, had then by mutual consent laid down their arms. The Highland clans nearer the south, were also somewhat affected by the same cause; whilst those of the interior, of whom Montrose's army were mainly composed, retained the ferocity of their ancestors. With Montrose died the hopes of the royal cause: Cromwell trod down the

[a] Montrose's Memoirs, 69. [b] Ibid. 113. [c] Ibid. 133, 137.
[d] See the Beauties of Scotland, V. 188.

aspiring spirit of the cavaliers, and crushed the energies of the north. Forts were built at Inverness and Inverlochy; and the heads of the clans compelled to give sureties for their good behaviour.[a] When Charles II. was restored, these forts, which had proved so conducive to the internal quiet of the country, were destroyed as hecatombs to the genius of loyalty; and the Highlands again relapsed into their former turbulence: the detestable spirit of clan-feuds was even brought to the aid of the laws;[b] and the dogmas of religion imposed by the broadswords of the "Highland host."[c] We shall not

[a] The following is the narrative of a bond of relief of such suretyship for a chieftain in the subsequent reign of William III. It is dated at Edinburgh, 5th August, 1697, and is in the author's possession. "Be itt kend to all men by thir present letters, us Archibald Earle of Argyle, and George Viscount of Tarbatt, forasmeikle as upon ye 21 day of Jullie, last bye past, *Kenneth Mackenzie of Cromartie became cautioner* and sovertie to the lords of his Matie prive councill *for the pacable and good beheavior of Allan M'Donald of Moydart*, under this present government, and that he should present the sd. Allan M'Donald to the lords of prive councill when requered thereto, and that under the peanultie of ffiue hundreth pounds *stearling* money, as the same bond of the daitte forsd. more fullie proports; and now considering that the said Kenneth Mackenzie should sustaine no loss, trouble, or prejudice through his sd. cautionary; and for the kindness and favor we have and bear towards the sd. Allan M'Donald, Therefore witt ye us to be bound, &c." (To relieve in usual form.)

[b] Caledonia, I. 863.

[c] Beauties of Scotland, V. 190. Calderwood's Hist. of Church of Scotland.

Colonel Cleland of the Cameronian regiment, who fell in the battle of Dunkeld, thus satirizes the marauders who, in 1678, poured upon the western shires.*

* Poems, p. 11, 12, 13.

therefore be surprised, that disaffection to the expulsion of the brother of Charles, marked the conduct of the Highlanders; or that removed from the scene of his errors, they looked upon him only as their legitimate feudal superior; without questioning the justice of the sentence which lost him a kingdom.

On the night of the 11th November, 1688, Viscount Dundee,[a] taking advantage of these feelings, left Edinburgh, attended by a force of

> "Some might have judged they were the creatures
> Called *Selfies*, whose customs and features
> Paracelsus doth descry
> In his occult philosophy;
> Or Fauns or Brownies, if ye will,
> Or Satyrs come from Atlas hill.
> But those who were their chief commanders,
> As such who bore the pirnie standards,
> Who led the van, and drove the rear,
> Were right well mounted in their gear,
> With brogues, trues, and pirnie plaids,
> With good blue bonnets on their heads,
> Which on one side had a flipe
> Adorned with a tobacco pipe;
> With durk and snapwork, and snuff mill,
> A bag which they with onions fill;
> And as their strict observers say,
> A tupehorn filled with usquebay;
> A slasht-out coat beneath her plaids;
> A targe of timber, nails, and hides,
> With a long two-handed sword.
> In nothing they're accounted sharp,
> Except in bagpipe and in harp."

Allowing for the temper of the writer, this may be accounted no bad description of the Highland garb, much as has been written on that topic.

For a complete sketch of the costume as worn in the last century, see Birt's Letters, II. 84.

[a] His Memoirs, p. 28.

thirty cavalry. After traversing Perthshire, Angus, Aberdeen, Banff, Moray, and Nairn, he effected a junction on the 1st of May, 1689, with Macdonald of Keppoch, who lay before Inverness with 900 men. Eight days before his arrival, the magistrates had proclaimed the Prince of Orange king; making preparations at the same time for enforcing his authority.[a] Matters were finally compromised by Keppoch receiving 2000 dollars to withdraw; and on the 13th June, 1689, the forces of the rival monarchs met in the pass of Killicrankie; when the Highlanders achieved a splendid, but useless triumph, at the expense of their commander,[b] who fell in the moment of victory.

At the accession of George I. the Highlands continued to present the same singular aspect, as in former reigns. The union of the two crowns had not removed the bitter conflicts of party spirit; and the conduct of the new monarch was nowise calculated to allay disaffection. An

[a] The following entry appears in the Inverness session records:

"28th April, 1689, That day, sermon was preached be Mr. Gilbert Marshall in the forenoone at the Cross, and that by reason Coll. Macdonald was about the town, boasting to come in with his whole force, consisting of 8 ore 900 men, to plunder the town. Afternoone, Mr. Mackenzie preached as aforesaid, all the citizens being necessitate to stand in a *posture of defence*. No collection. Tuesday, no sermon, and that be reason of our confusions. 16 May, 1689, ane thanksgiving sermon preached be Mr. Gilbert Marshall, and that be vertue of ane act ishewed furth be the convention of states for our safe delyverie from the power and tirranie of the papists. Text 124th psalm, 14th verse.

[b] Acts of Scottish Parl. IX. App. 61.

address from the heads of Highland clans met with contempt,[a] and insurrection broke forth. When his Majesty was proclaimed in the town of Inverness, the magistrates opposed the sheriff in the execution of his duty; and even encouraged a mob to break the windows of those whigs who had illuminated their houses on the occasion.[b] The years 1715 and 1719 were both marked by rebellion; but whatever attempts were made towards its extinction by forfeitures, suppression of heritable jurisdictions, and the disarming of the Highlanders, seem to have soon worn off. The terror of forfeiture was momentary: full effect remained to be given to the second remedy from subsequent experience; and the act which empowered General Wade to take away the arms of the Highlanders, did not cure the evil, root and branch. Many clans, disaffected to the government, remained in possession, while the loyal ones surrendered their weapons: Many persons, on pretence of being necessitated to carry arms, were permitted to do so; and the irregular force, called the "Black Watch,"[c] calculated under precautionary measures, to have been of immense service to the internal police of the country, was itself a dan-

[a] Appendix to Birt's Letters. Culloden Papers. Smollett's History.

[b] Ibid.

[c] It was the taking away of his company in this corps, which was made the main pretence by Simon Lord Lovat, for joining the rebellion of 1745. (See his trial.) State Trials, vol. xviii.

gerous engine of feudal power.[a] The letters of Captain Birt, opening as they do, upon the manners and customs of a people till then almost unknown to the rest of the island, must convince us, that at the period of the rebellion in 1745, the spirit of change had effected little on the characteristics of the Highlanders. Society had stood still, and "life knew nothing of progression or advancement."[b]

The occurrences of that memorable year, were such, as to excite the astonishment of all Europe. A handful of mountaineers shook the throne of one of her most powerful sovereigns; and might have seated their leader, but for disunion among themselves, in that sovereign's place. The success which crowned their first advance, is in a main degree attributable to the superiority they possessed over their Lowland brethren in the use of arms; and the vague, and indistinct notions these latter entertained of a people, whose

[a] Poverty with its attendant evils pressed sore even on the royal boroughs, as clearly appears by a petition of the burgh of Dingwall (1724) to the convention of boroughs, setting forth—"That being reduced to so great poverty wee were not able to send a commissioner to the General Conventione halden at Glasgow in July 1704, when there was two shillings *Scots* of the ten pounds then divided amongst the burrowes, added to the shilling wee used formerly to be in the taxt roll, the stenting whereof was soe heavy upon the inhabitants, that a great many of them have deserted the toune, which is almost *turned desolate*, as is weel known to all our neighbors; and there is hardly any thing to be seen but the *ruines of old houses*; and the *few* inhabitants that are left, having now noe manner of trade, live only by laboring the neighbouring lands, and our inhabitants are still dayly deserting us."*

* In author's possession.

[b] Johnson's Works, VIII. 335.

warlike attributes were magnified in their imagination into something supernatural.[a] It is well known that the disarming act, consequent on the insurrection of 1715, was in a great measure nugatory; and, that the Highlanders still preserved the martial, and predatory habits of their forefathers. The cabinets of France and Spain availed themselves of these circumstances to facilitate the restoration of the Stewarts: They appealed to the heads of tribes, in behalf of an exiled and unfortunate race, as to men deeply interested in preserving the royal prerogative by regard to their own power, now threatened to be pared down by the innovating hand of reform: They excited the lofty and chivalrous daring of ardent spirits, by the promises of rewards and honours from a dynasty, proverbially false, and forgetful of services: They painted the fallen splendour of their royal, though ill-obeyed masters; and lured the clans, by specious pretexts, to their destruction. Luckily for their purpose, the disorganized elements of clan-policy, had as little opportunity, as inclination, to reason over the proposal. Divided by natural and political causes, and individually acted upon, by peculiar wants and feelings, the clans presented diversified points of attack to the emissaries of rebellion. These well knew that the strong attachment of a Highlander to his sovereign, founded on feudal and patriarchal principles,

[a] See Home's, Patten's, and the other different accounts of the Rebellion, and Stewart's Sketches, I. 251.

could have no check in the accuracy of actual observation.[a] But not the least powerful engine against the ruling powers, was the difference of religious feelings and prejudices. These never attained that tincture of gloomy fanaticism in the Highlands, which soured the dogmas of their reforming brethren in the south. For the spirit of every government of a regal character is inimical to the extravagancies of a sectarian mind: and continuing attached to the doctrines of Rome, or the reformed Episcopal communion, the Highlanders were the more readily induced to side with the princely adherents to similar sentiments. But had they studied the history of their own treatment, they must have found, however circumstances varied, that they would continue to excite the jealousy and persecution of the executive. For, however unpalatable the truth may be, it is certain, that the Stewart family did whatever in them lay, to curb their aspiring pretensions. What had they then to gain, by the re-accession of that justly expatriated race? Nothing, I am bold to reply. But in applying censure to the cause, let us not blame the devoted gallantry of its adherents. However shallow its merits, *they* at least gave it a redeeming character, and we shall continue to dwell on this portion of our domestic transactions, as on one in which the

[a] Colonel Stewart's Sketches, I. 100. Mrs. Grant's Essays on Superstitions of Highlanders, I. 17.

high qualities of courage, attachment, and inviolable fidelity, shine prominent and conspicuous.[a]

If I have been at all correct in my deductions, we need not linger on our march. In the long lapse of time, where aught can be discovered, tending to the amelioration of the Highlands, it is to be looked for in Cromwell's sway. The minds of men, softened after the ravages of war, had leisure and inclination to turn to the more pleasing images of domestic enjoyment. If Cromwell subdued the Highlanders by the rigour of his arms, he tamed their natural ferocity not less effectually, by making them acquainted with those arts which constitute the happiness of social existence; and the town of Inverness in particular, is deeply indebted to him.[b] Foreign invasion, however, to be dreaded at the moment, has some equivalent in return for its horrors, when the turbulence of the waters has subsided, and repose has again settled over the political horizon.

The measures of Government,[c] for the destruction of the patriarchal system of the Highlanders, have been looked upon as originating in uncalled for severity. Whilst we admit the partial truth of the charge, let us remember the nature of the times. However much the *beau-ideal* of clan-policy may warm our imaginations, or excite feelings of regret for its decay; however

[a] How just was Johnson's prediction, that the name of Flora Macdonald would live in history!

[b] Johnson's Journey, Works, VIII. 238.

[c] Colonel Stewart's Sketches, I. 115.

much of the romance of existence[a] be thrown around the modes of life, and the deeds of such a state of society, it is evident the peace and prosperity of the community called for its dissolution. So long as independent tribes set the laws and usages of the civilized classes of mankind at defiance, the integrity of the monarchy was in danger.[b] To disseminate the blessings of settled government, a blow was required, sudden in its operation, and certain in its consequences. The abolition for ever of heritable jurisdictions, ward-holdings, and the Highland garb, effected what had hitherto been attempted in vain. Yet the policy of depriving the natives of their ancient and graceful costume, has been questioned. A violent encroachment on the feelings of an entire people may engender a callous indifference to the ties of honour, and the calls of martial renown. The incentive to action, as a peculiar race, was excited by the appearance of a dress associated with the memory of their sires; and its lingering existence, is a testimony to the force of national partiality triumphing over every difficulty.

As already observed, the peculiarities of the Highland character remained in full force at the

[a] See MacCulloch's Letters, IV. 320 *et seq.* Mrs. Grant's Essays on Highlanders, Dr. Grahame's Writings, and Stewart's Superstitions of the Highlands.

[b] What would be thought nowadays of a Highland chief telling the Supreme Law officer of Scotland, that if he knew the rogues who had insulted his Lordship, he would make them smart for their temerity? Yet such was the tone used by Lord Lovat to Lord President Forbes, when the latter complained of an attack upon his house by the Stratherrick Frasers.—*See Culloden Papers.*

breaking out of the rebellion in 1745. The legislative enactments subsequent to that period dissolved the clan-system, and gave liberty to the people: They taught the Highland peasant to claim inheritance with his southern brethren in the charter of constitutional freedom: They awoke the slumbering energies of a nation long bowed down in feudal thraldom, and aroused the spirit of honourable adventure, and personal independence. The attention of the lairds was directed to the improvement of their estates; young gentlemen of family, finding no resource at home, now that the ancient means of a varying existence were at an end, entered into the liberal professions, and imbibed the sentiments of their calling; whilst not a few of the commons joined the military service; where, as they must have seen varieties of character, they acquired new notions and habits. But what forcibly tended to revolutionize the Highland character, and to create a comparative indifference in the lower ranks towards their chiefs and landlords,[a] was the extreme impatience of the latter to better their rent-roll, without a due regard to the slow and certain aid of circumstances. Many vallies formerly peopled by numerous families, were thrown into the grasp of one monopolizing tacksman; and glens where the pibroch and song resounded, and a hundred "fires" arose, were despoiled of their inhabitants, and surrendered to flocks of sheep. The rebound from feudal despotism to

[a] Johnson's Journey, Works, VIII. 325, 326. Stewart's Sketches, I. 123. Beauties of Scotland, V. 192, 193.

insatiate speculation, was almost instantaneous and destructive. Deprived of his state, of his patriarchal and feudal privileges, the Highland landholder seems to have resolved upon the part of a hard taskmaster, as a satisfaction to his wounded pride for the immunities he had forfeited;[a] and thus the country lost thousands of efficient men, who, driven "in a state of helpless despair to the wilds of a far distant land," there became the most inveterate enemies of that isle which had given them birth. So long as the Highlands remained under the feudal system, an excessive population was the necessary consequence. Money was of no use: Men were the sinews of war, and the greatest grace of the warrior, a numerous body of retainers. But when this bond of union was dissolved, these very vassals became objects of indifference. The middle ranks, by a sudden revolution of circumstances, found themselves in every quality acknowledged as a distinction in a refined age; and in the wealth which confers weight in society, and the possession of the comforts and conveniences of life, far below the corresponding class in the south. With all the pomp and pride of birth, they felt keenly the poverty of their situation. The subordinate class, still more wretched, were at once deprived of a protector, of a liberal purveyor to their wants, and of the attractive pleasures of a semi-barbarous life. To rid himself of all craving supernumeraries was the immediate object of the laird.

[a] Johnson's Journey, Works, VIII. p. 319, 326.

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The most profitable purpose to which the extensive moorlands of the Highlands of Scotland can be applied, is obviously the rearing of sheep. That the landed interest should have co-operated in the adoption of this plan, of making their mountainous wastes yield a return of that, which constitutes the riches of civilized life, is what the altered state of society entirely justifies. And a retrospective glance at once convinces us, that the Highland chieftain's retainers, who, during the dominion of feudal usages, swelled his state and consequence, in the exact proportion of their numerical force—could not, consistently with his changed and pecuniary views, be permitted to remain scattered amidst the recesses of his glens and vallies. A large proportion of the hardy Gael, instead of continuing to be regarded as the legitimate, because indigenous occupants of the soil, came to be looked upon as burdensome sojourners in those fastnesses where all their affections were concentrated. But it was certainly the imperative duty of the chief, in sheathing his sword, to have provided for the martial followers who had done his behests in the stirring times of clan warfare; and to have afforded them an asylum, either on the sea-coast, to which his new policy did not reach, or in other vallies, as yet undevoted to the universal doom. He should have borne in mind that the redundant population were entitled to his good offices, and that he was not warranted in withholding that countenance, without a temporary continuance of which, they could not elude certain starvation,

if they were to remain in their native land. It is to be regretted such considerations were too frequently unheeded. Every man has undoubtedly a sacred interest in the enjoyment and use of his property: But proprietors ought to have calculated their resources. They should have remembered that a country such as theirs, emerging from barbarism, was in a very different state from the rest of the island; that old prejudices were to be encountered and removed, not by the hasty hand of violence, but by an exposure of their folly; and that a temporizing spirit of slow, but gradual growth, was the surest means of increasing the prosperity, whilst it preserved the population of the country. A very lamentable effect of this strained system, has been, a diminution of honourable principles among the peasantry.[a] They have betaken themselves to smuggling, to make up the rents their little farms cannot afford. In this hazardous enterprise there is much of keen and savage excitement. Indolently stretched along the heath watching the progress of the distillation; or engaged in some bold attempt, or cunning stratagem, to foil the officers of the revenue, the smuggler contracts an indifference to a settled course of industry; whilst he becomes habituated to falsehood, fraud, and perjury. A lingering attachment (yet remaining) to their superiors, joined with a consciousness perhaps, of being in his debt, beget feelings of humility, with no slight degree of duplicity to avert his anger, or

[a] Stewart's Sketches, I. 130.

flatter his consequence. These views have been treated so ably by Colonel Stewart, that I shall content myself, by merely quoting a passage from his work, in further argument. "Little could the Highlander calculate when his fears were excited by vague ideas of a change, nor could he anticipate, that the introduction of civil order, and the extension of legal authority, which, in an enlightened age, tend to advance the prosperity, as well as promote the security of a nation, should have been to his countrymen either the signals of banishment from their native land, or the means of lowering the condition of those who were permitted to remain. With more reason, it might have been expected that the principles of an enlightened age, would have gradually introduced beneficial changes among that ancient race; that they would have softened down the harsher features of their character, and prepared them for habits, better suited to the cultivation of the soil, than the indolent freedom of a pastoral life."

Thus much for the bad side of the picture. Happily, there were landlords who pursued measures in aid of the legislature's views, of a different complexion. With the true spirit of patriotism, whilst they turned the labours of their liberated tenantry, by judicious management, to the increase of their own incomes, they were no less solicitous for the amelioration of the people; and wherever we find this union of profit with justice, the bond of association is drawn together, by ties of affection and attachment, infinitely more

deserving of admiration, than the blind obedience of ancient times. A very happy instance was exhibited in the facility with which Highland landlords raised such vast numbers of men for the army, during the last war. It is no doubt true, that with his change in condition, the common Highlander has laid aside many of those habits, which endear to the fancy the memory of early associations and traditional tales: He has become a common-place personage, possessed of none of those chivalrous attributes with which romance was wont to invest his fathers; he is acute and cunning, and has often been accused of incorrigible laziness. But his indolence is the effect of situation. Mr. Birt long ago observed, that the Highland peasant was by no means averse to labour, if he saw a prospect of fair remuneration; and when convinced of the utility of innovation,[a] he can enter into the plan with activity and zeal.

In considering the astonishing alteration which has been made upon the Highlands since the last rebellion, the mind finds so few materials upon which, to build a regular construction of advancement, as almost leads it to recoil in disbelief of what has been effected. The revolution in sentiment and character appears to have been almost instantaneous. Natives now listen to the tales of the last century with the same wonder as to the exploits of the American Indian, forgetful that perhaps their own relations were the actors; and the country round Inverness which, in Birt's time, presented but two

[a] Stewart, I. 173.

fields of wheat, is now a landscape of the richest and most luxuriant crops. To point out a few of the means of improvement, but not in progressive rotation, shall now be my endeavour.

One of the first steps to the awakening of a people from a state of ignorance, must be the dissemination of religious knowledge. Destitute of teachers, and debarred all intercourse with their southern fellows, by the impassable barriers of their mountains,—the Highlanders were strangers to the blessings of a regular ministry, of the arts of reading and writing, of schools, and of teachers, till the year 1646.[a] We recur with intense veneration to the periods of Iona's glory and renown, when this favoured isle shone the blessed gem, whence knowledge diffused her stores. "As he who long coasting the rugged and barren rocks of Mull, or buffeted by the turbulent waves, beholds with delight[b] its tower first rising out of the deep, giving to this desolate region an air of civilization, and recalling the consciousness of that human society which seems to have abandoned these naked shores to the cormorant and seagull;" so does the picture of its history affect our imagination. But where universal gloom overspreads the horizon, what can a solitary taper effect? This very isle, "the luminary of the Caledonian regions," is *now* entitled to receive only four sermons a year

[a] Moral Statistics of the Highlands, by Inverness Society for Education, p. 12.

[b] MacCulloch's Western Isles.

from the minister to whose parish it is attached.[a] Benighted in darkness, the Highlands were unprovided with religious treatises in the native tongue till 1690! For the first time, a Gaelic version of the Psalms was then published, and soon thereafter, a translation of the Confession of Faith. 3000 copies of an Irish translation of the Bible were printed in the same year for the Highlands.[b] The lamentable condition of the clans called forth the regards of the General Assembly of the Scottish Church; and a society for the propagation of Christian Knowledge, was formed in Edinburgh, in 1704. Nineteen presbyterial and fifty-eight local libraries were erected in various districts, in 1705 and 1706; few of which at present exist: Schools were instituted by the same Society for English reading, writing, and the elements of Christian knowledge. In 1719, these had increased to 48. In 1732, to 109; and at the beginning of the present century, to 200. In 1738, the Society extended their plans, by the institution of schools of industry to instruct females in spinning, sewing, and knitting. Of these useful seminaries, it now supports 89. The same motives which laid the foundation of the Society for propagating Christian Knowledge, suggested an application to government, in 1725, for a fund to support assistant preachers. These were necessary in a

[a] Dr. Dewar's Letter to Sir J. M. Riddel, on the Highlands, 1819.

[b] Moral Statistics, by Inverness Education Society, 14.

country separated by large arms of the sea, rapid rivers, extensive moors, and lofty mountains; where the individual efforts of the pastor, however zealous, could make but feeble impression on the inhabitants. The sum of L.1000 a-year was accordingly granted, and placed in charge of a committee of the General Assembly; by whom twenty preachers and twenty catechists were appointed to the more destitute districts: At a later period, this grant was doubled; and the committee now maintains thirty-one ministers, and twenty-four catechists. Notwithstanding these efforts, the dissemination of knowledge has been comparatively circumscribed. The mass of the people, from the period of the last rebellion to the present day, have remained sunk in ignorance and poverty. The causes of this lamentable state appear to be threefold. In the first place, the rudiments of instruction conveyed to the Highland peasantry, were, till the commencement of this century, entirely in the *English* tongue; whilst the *Gaelic* language was retained as the ordinary medium of intercourse. By this, I would wish to be understood as saying, that the efforts of the teacher were confined to training his pupils to *read*, instead of leading them to *comprehend* the import of English composition.[a] The two

[a] The following is an extract from a letter of a Highland clergyman, addressed to an intimate friend of the writer: "As to the education of the Highlanders, it will never be accomplished until a different system from the present one be adopted. Pray what is

languages should have gone hand in hand: no foreign tongue is ever taught as a written one, till the pupil can read in his own. The mere mechanical capacity of reading English can serve no purpose; and, on the other hand, to restrict the Highland peasant to the few Gaelic works we possess, would be to forbid him access to the stores of general knowledge. In the second place, the schools were infinitely too few in number, for a population, which, in less than a century,[a] had increased 100,000; whilst, in the third place, the vast and disproportionate extent of the Highland parishes themselves, embracing a surface of every imaginable diversity of character, was a barrier to civilization. Many of

the use of forcing children to read and repeat what they do not understand? I could find thousands in the Highlands of Scotland who will read the *English* Bible tolerably well, but cannot understand more than '*yes* or *no*;' and being thus obliged to continue reading a language completely unintelligible to them, it gives them no pleasure, but rather disgust; and the moment they leave school, if they remain at home in those districts where nothing but their mother tongue is spoken, they lay their books aside, and never look at them more. I know some men who were at Inverness at their education sixty years ago; they could read and write when they left school, and to-day cannot read any. How, in God's name, could the people be expected to read even in their *own* language, when their pastors could not read nor write that language, although they preached it to the poor people? The clergy read no more than the text, whereas if they would read every Lord's day, a chapter or two out of the Holy Scriptures, the people in that case would be inclined to bring their Bibles to the kirk, and they would follow the minister. Even in the present day, I venture to say that there are a few of the Presbyterian clergy in the Highlands and Islands of Scotland, that cannot read a chapter out of the Gaelic Bible!!"

[a] Moral Statistics, *ut supra*.

these parishes are sixty miles in length from sea to sea, and have but one church; and some contain but a single place of worship capable of holding the congregation in the whole parish. About 3000 souls in the parish of Lochbroom are excluded from all acquaintance with the gospel, except by the ear; and they do not hear a sermon oftener than twice or thrice;—in other districts, but *once* during the twelve months.[a] "It is not unusual to travel forty or fifty miles without meeting one in a hundred who can read or write, or speak English, except gentlemen's families."[b] But, besides the extent of the parishes, and the disinclination of the Highlander to receive instruction in any language but his own, there existed for many ages, a leaning to the Catholic ritual. The Presbyterian form of church government was not firmly established till the reigns of George I. and II.;[c] and a predilection to the Episcopalian communion, was evinced by the adherents of Prince Charles, in 1745. These sentiments have by no means lost ground with their descendants; and we must look for more diffued means of communication, ere we can find the dissimilar elements of Highland society drinking at the fountain of instruction. I shall pursue the track of what has been attempted to the attainment of this end, by following the details of the Inverness Society for

[a] Moral Statistics, App. III. IX.
[b] Ibid. IX.
[c] Colonel Stewart's Sketches, I. 134.

the Education of the Highland Poor. In 1769, the Scriptures were first printed in *Gaelic;* but the whole Bible was unknown in that tongue till 1802.[a] In 1811, the Gaelic School Society of Edinburgh, was formed for the express and laudable purpose, of teaching Gaelic reading exclusively; and the sincere well-wishers of the Highlands, must rejoice in the fact, that this institution supports seventy-seven schools, containing 4300 scholars. Similar societies have been established at Glasgow and Inverness, jointly maintaining 125 schools, and perhaps 5000 scholars. With all the aid of government, benevolent institutions, and individual exertions, the following facts have been established, in a report of the Inverness Education Society; as creditable to the heart as to the head of the writer.

1st, *As to education.* Half of *all* the population are unable to read; above *one-third* of the whole population are more than two miles, and many thousands, more than five miles, distant from the nearest schools.

2d, *Diffusion of the Scriptures.* That in the western parts of Inverness and Ross, all the Scriptures found existing are in the proportion of ONE copy of the Bible for every eight persons above the age of *eight years;* and in other parts of the Highlands and Islands, including Orkney

[a] A translation in the kindred language of *Ireland* was printed by the celebrated Boyle at his own expense, in 1685.

and Shetland, *one* copy for every three persons. One-fourth of all the families in these districts, or 100,000 persons are still *wholly* without Bibles; and there are in this number, several *thousand* families in which there are persons who can read the Scriptures.

Whilst we thus see the small advance which knowledge has made among the mass of the community, its dissemination among the superior ranks has long been respectable.[a] The *heads* of clans even in dark ages, imbibed some acquaintance with the literature of the day, from the prevalence of a French education.[b] To this they were necessitated by the want of competent means of instruction in their own country, and the impossibility of receiving it in the lowlands, or England, from their almost constant wars. It was to France all Scotsmen looked as to their natural ally; and as the Highland chiefs

[a] Johnson's Works, VIII. 338.

[b] "Till of late years," we are told by an eminent female writer,* "letters were unknown in the Highlands, *except* among the *highest* rank of gentry and clergy." There is too much reason to believe the remark correct. For whatever progress in knowledge might have been made by the chiefs, many of the subordinate leaders and tacksmen were extremely ignorant. "Wi my hand at ye pen, led be Mr. Martin Loggie, Notar Publick," was no unusual expression by Inverness lairds, in the middle of the sixteenth century. In a bond of manrent now before the author, the head of a very ancient and respectable branch of the clan Fraser is thus documented: 2d December, A. D. 1578, "James Fraser in Belladrum, with my hand at ye pen *led* be Maister Martine Loggie, Nottar Publick at my command be me speciallie requirit thairto. *Ita est* Martinus Loggie Notarius Publicus."

* Mrs. Grant's Essays, I. 30.

were destined to play at times important parts in the national drama, a polish in address and knowledge was necessary to the due performance of these with adroitness and finesse. But the example of the church had been instrumental in confining science within the bounds of the *Latin* tongue.[a] Without an acquaintance with that language, no man could taste of the streams of learning; and as it was deemed a degradation to employ the national speech on literary topics, the Highland barons, whilst they acquired a relish for the poems of ancient Rome, would disregard the feeble efforts of native genius. Hence, perhaps, the groundwork of that intimacy with the Latin writers which many Highland gentlemen displayed a century ago; yet it does not appear that the Greek was ever known in the territories of the Gael of Scotland.[b] Slight as was the pontifical authority obtained by the Roman see over this country,[c] ecclesiastic establishments were scattered,—sparingly it is true,—in the remotest corners of the Isles and Highlands;[d] and although the scholastic theology

[a] Robertson's View of Society in Europe, 83.

[b] Grant on the Gael, 31.

[c] Hailes's Annals in confirmation.

[d] We may instance a few of these:—*Priories;* Bewlie, Kingussie, and Urquhart. *Abbeys;* Fearn, Inchaffray in Strathern, Colonsay in Argyle, Abernethy in Perthshire. There were monasteries of different orders at Inverness, as well as chapels to the Virgin, St. John the Baptist, and St. Catharine. Hugo de Roos, first laird of Kilravock, founded a chapel at Geddes, which he dedicated to the Virgin Mary. There was one also at Balnagown in Ross, where prayers were daily offered for the king and his successors. (Inq.

and attainments of the brethren were defective, they gave some scope to the reasoning powers; so that their example and occupations, may be supposed to have had a share, in softening the ruder minds of their mountain patrons. The Reformation which enlightened the Lowlands, was the cause, nevertheless, of a retrograde in knowledge of all kinds, by the Highland population. A century elapsed from the downfall of the papal power, before the condition of the northern districts attracted attention on the part of government, "and whilst their former feeble instructors were taken from them, no successors appeared."[a] Even when measures were, for the first time, adopted by the General Assembly of the Scottish Church, on 18th June, 1646, "for planting a ministry, and providing kirks throughout the Highlands and Islands," it was found no easy task to carry the same into execution. Clergymen refused livings "so poor as not to afford bread" among a barbarous people; and the few who were induced to dedicate themselves to the care of souls, were ignorant of the Gaelic tongue. In the face of these difficulties, the magistrates of Inverness appear to have entered into the views of the Assembly with ala-

Ret. Lib. X. fo. 44.) There were cells of monasteries at Lochtay and Oronsay. On this subject see Spottiswoode's Religious Houses. The bishops of Moray, Dunkeld, and Ross, were suffragans of the archbishop of St. Andrews; those of Argyle and the Isles, suffragans of the archbishop of Glasgow.

[a] Report of Inverness Education Society, II.

crity and zeal; and their countenance must have operated with no slight effect on the habits of the surrounding mountaineers. We find from the town records, that salaries were paid to teachers by the burgh, as far back as 1646;[a] and their labours could not have been unproductive, when the magistrates in 1662 prohibited *all* persons but the town teachers, from giving instruction in reading, or writing within its bounds. In 1677, the council enacted, "that Mary Cowie shall not teach reading beyond the proverbs;" a proof that the tree of knowledge had taken root in this remote quarter, where it gradually attained strength. A sum of L.1200 was bequeathed in 1726, by Mr. John Raining of Norwich, to form a fund for the support of charity schools in the Highlands; and in the year 1747, the Society for Propagating Christian Knowledge, under whose charge the money was placed, built their house in Inverness, and granted the school in perpetuity to the town. Twenty years afterwards, the town council established a school for young ladies, with a regular salary to the mistress; but the present academy of Inverness, which has justly received the approbation of many eminent names, was not erected till 1791. From the period of the last rebellion to the present time, seminaries of education of respectable attainments, have been

[a] Memorabilia of Inverness.

gradually opened at Tain, Fortrose, Fort William, and other points of the Highland line.

From the tenor of the preceding remarks, it will be seen that I have confined them to the male sex. I was unwilling to hazard conjectures on the modes of life, and the mental resources of our fair countrywomen in past ages, without patient and dispassionate inquiry. The notices I have been enabled to collect, are confined, it is true; but they are the result of communings with those ladies of the "olden time," whose narrative was that of their own childhood, aided by the gleanings derived from their parents. It would appear that female education at a remote era, was purely domestic. At the period of the last rebellion, girls of the highest rank were instructed by governesses, who were always women of superior attainments. Their range of knowledge seems to have been limited to *English* literature. Each young lady had her own department of the household to superintend: one looked after the poultry; another the culinary arrangements. To sew, spin, cast accounts, work tapestry, play on the spinette, and some few to possess a taste for flower gardening, were the amount of their accomplishments. It was the fashion for the men to drink deep and to excess;[a] and when they joined the female circle, tea was made and superintended by the daughter of the host, in all

[a] Mrs. Grant's Essays, II. 118.

the formality of ceremony. Cards succeeded for the older part of the community; whilst the younger betook themselves to various indoor amusements, chiefly dancing.[a] With supper and Gaelic songs, the day terminated. Some such scene probably inspired the elegant compliment of Johnson—That whatever is imaged in the wildest tale, would be felt by him, who, wandering in the mountains without a guide, or upon the sea without a pilot, should be carried amidst his terror and uncertainty to the hospitality and elegance of Raasay, or Dunvegan. These observations apply only to the *haut monde* of Highland society. My investigations lead me to suspect, that the endowments of the wives and daughters of the second class of chieftains or tacksmen, were extremely inconsiderable; and I have seen instances where *their* pens were guided in their signatures, as well as those of their husbands. It must be remembered, the sphere in which they moved, called upon them to be *useful*, not *ornamental*. Of what benefit would the modish airs of a modern *belle* have been to a Highland gentleman in his hut? The change of manners consequent on the downfall of feudal policy, gave the better classes the means of paying for that instruction, which the erection of schools was to diffuse; and the Highland ladies may now challenge comparison, as possessed of every feminine grace, with their

[a] See Johnson's Works, VIII. 279, 303.

countrywomen of the south. But it is lamentable to think, that females of the lower ranks are still so little regarded, as to be exposed to all the drudgery of outdoor labour, in addition to their domestic toils.

In the efforts of government to lessen the evils of the clan system, and to invigorate the nascent energies of the Highlanders, after the rebellion, they greatly neglected the means of enlightening the minds of the people; and left these desirable ends to the voluntary contributions of individuals, or societies. As the opening up of communications is one of the main conduits to civilization, the policy of ministers was rather directed to the attainment of a knowledge of the features and capabilities of the country; and in effecting their purpose, the name of General Wade[a] will long be entitled to grateful remembrance. The expediency of becoming acquainted with the internal aspect of the mountain glens, had been seen in the insurrection of 1715, when the royal troops found it impracticable to advance beyond Blair Athol. About the year 1730, three great lines of road were accordingly commenced. One ran from Stirling to the western divisions of Perth and Argyle; and thence through Glencoe, to Fort William. The second united Fort William with Inverness; and the third, stretching from Inverness across the

[a] "No partial flattery need thy verse invade,
That in the ear of Scotland sounds a *Wade*."*

* Albania—a Poem. Leyden's Scottish Descriptive Poems, p. 147.

Grampians to Dunkeld, connected the entrances into the northern and southern Highlands. Minor branches traversed the country at different points from these main roads; and the whole were executed by parties of soldiers. We shall not detail the various schemes devised for their support or alteration since then. It will be enough to remark, that in 1802-3,[a] an act was passed, by which government undertook the half of the estimated expenses of the necessary additional roads and bridges in the Highlands, whilst the other moiety was to be defrayed by the proprietors of the land who were benefited by them; and commissioners were appointed for the proper expenditure of the requisite outlay. Under this system, the old military communications are still kept up, whilst numerous other lines of road have been added; and the Highlands have thus been laid open to inspection in their most secluded wilds. The Highlanders were not, however, in a condition to avail themselves at once, of the benefits afforded them. For many years after the rebellion, the mountains were infested by predatory bands, composed of the scattered remnants of the routed army, who rendered travelling on horseback, (then the only method of journeying) insecure, if not impracticable.[b] A postchaise was first seen in Inverness itself, in 1760, and was for a

[a] App. Agric. Report of Scotland, III. 228. Reports of the Commissioners for Highland Roads and Bridges.

[b] Culloden Papers, XXII. Note.

considerable time, the only four-wheeled carriage in the district. At the present moment there are three manufactories for coaches in Inverness! While people thought a journey to Edinburgh, an undertaking of such magnitude as to require them to frame their will before setting out;[a] an impediment to intercourse was presented on the one hand, by the unwillingness of the Highlander to mix with a Lowland people, against whom old prejudices still remained; and on the other, by the exaggerated picture of danger and misery, which the fertile mind of the Saxon conjured up, as attendant on an incursion into the Highland hills. Looking back to what the Highlands had been, he pictured a gloomy region, inhabited by barbarous and ferocious tribes, to whom he attached ignorance, pride, and insolence; whilst the mountaineer repaid the sarcasm, by contempt for the mechanical habits of the Lowlander, sprung in his estimation of an inferior and mongrel race.[b] These mutual prepossessions continued till the present century. In it, we have seen the downfall of animosity, and the intelligence and public spirit of individuals triumphing over national bias. Six public coaches (including the Caledonian to Perth, the first vehicle which communicated with the south) now arrive at, and depart daily from, Inverness; all of which have been esta-

[a] Birt's Letters, I. 5.

[b] Mrs. Grant's Essays, I. 28. Johnson's Works, VIII. 317.

blished within a period of twenty years. Previous to the year 1819, the post was conveyed from Inverness to Tain on horseback, and from thence across the friths of Dornoch and Loch Fleet, by foot runners to the extremities of the island. To complete the munificent views of Parliament, and to surmount the inconveniencies occasioned by the navigation of these dangerous estuaries, an *iron* bridge of 150 feet span, with two stone arches of fifty and sixty feet span respectively, was constructed under the superintendence of Mr. Telford, civil engineer, at an expense, to the heritors of Ross and Sutherland, (including public subscriptions) of L.13,971 sterling.[a] This work was commenced in the summer of 1811, and completed in 1812. To remedy the defect by which the general line of communication was cut off by Loch Fleet or the Little Ferry, a mound of earth was constructed across the narrowest part of the channel, 995 yards in length, exclusive of the bridge,—sixty in width at the base, and eighteen feet of perpendicular height. At the north end, the embankment terminates in a strongly built bridge, thirty-four yards long, consisting of four arches of twelve feet span each, fitted with strong valve gates. In 1819, the benefit of the mail coach system was extended even to the Pentland Firth. Horses were brought from Edinburgh, and

[a] Loch's Account of the improvements on the Stafford estates in Sutherland, p. 26.

stables and inns erected by Lord Stafford, at very considerable expense. By one common bond of intercourse, the two most distant parts of the island, the one situated at the extremity of the English channel, the other in the latitude of John o' Groat's House,[a] were thus joined together, at a distance of one thousand and eighty-two miles! In no country, it may be safely said, is there a parallel of so rapid a change.

But the views of government were not confined to the making of roads and bridges: Two canals were projected; the Crinan, and the Caledonian. The first cuts across the peninsula of Kintyre, and abridges a dangerous voyage from the west Highlands and Hebridean ports to the river Clyde;[b] whilst the second, running along the great glen of Scotland, connects the eastern and western oceans. Nature herself seems to have suggested the idea of an inland navigation along this track, traversed as it is, by a series of navigable lakes. In 1803, the practicability of the communication was essayed. Great expectations were entertained, that a spirit of industry would now be imparted to the Highland character, by the habits of application which the labourers on the various works were expected to acquire; and a final blow was anticipated to emigration. It would be cruel to suppose these hopes have not been in some measure realized; but it is to be regretted that the engineers and

[a] Loch, *ut supra*, 37.

[b] App. to General Report of State of Scotland, II. 231.

operatives to whom the furtherance of the design was intrusted, were permitted to employ so many foreigners, especially Welshmen; for the number of native workmen being inconsiderable, the salutary effects must have been inconsiderable in proportion. After a toil of about twenty years, this magnificent undertaking, so worthy of a great and enlightened nation, was completed. Gigantic as were the obstacles which impeded its progress, they were finally overcome in the autumn of 1822, when the canal was opened from sea to sea. "The echoes of the great glen then reverberated to the discharges of artillery, and to the shouts of hundreds of native Highlanders, who hastened to hail the first vessel, which proved that the avenues to commerce, industry, and wealth, were henceforth open to them."[a]

The herring fishery on the western coasts of Scotland, has been justly considered as a source of national wealth, and one in which the overflowing population of the isles and continent might be beneficially employed; whilst a nursery for seamen would be created at a cheaper rate than by a standing navy. In spite, however, of every encouragement both by government, and by the institution of various joint-stock companies, the expectations from the herring fishery have never been fully realized.[b]

[a] Picturesque Delineations of the Highlands, by J. G. Hamilton and George Anderson, F. R. S. E. P. 2.

[b] Sir George M'Kenzie's Report of the Counties of Ross and Cromarty.

Whether it be, that the landholders on the sea-coasts, have not used means to excite a spirit of enterprise among their people, or have failed in convincing them of the happiness and comfort they themselves would enjoy from the pursuit, certain it is, the western Highlands have not become that depot of adventurous mariners which was anticipated.[a] Whilst the shoals of herrings which frequent the north and west coasts are so great, that were the fishing to be carried on with regularity and spirit, full employment would be afforded to all who engaged in it, and emigration would be repressed,[b] the Highlanders have advanced little, either in the knowledge of the fishery, or of naval tactics. A powerful reason may be found, both in the mode of acquiring hands to guide the herring busses, and the antipathy shown on all occasions by the Highlanders to the sea-service. The masters of the herring vessels are for the most part coopers, and no more real seamen are required, than are barely sufficient to manage the ship; whilst the rest of the crew are straggling Highlanders and tradesmen accidentally picked up, who return to their different occupations on land so soon as the fishing is over, and either venture no more to sea, or at all events, not till the next season. Nor is this all: legal restraints and discouragements to commerce were given by the enactments respect-

[a] App. to General Report of Scotland, II. 240.

[b] Prize Essays of Highland Society of Scotland, II. 432, 427, 302.

ing salt. The best fishing stations were long resigned by the inactivity or incapacity of the natives, to traders from the Clyde and Holland; and thus the apathy of the former was in no slight degree aided by the belief, that the market was pre-occupied.

While I thus touch upon some of the means resorted to, for the amelioration of the Highlands, it were impossible to pass by in silence the exertions of those patriotic institutions which have sprung up in aid of the great cause. To arouse the mind from the sullen indifference of contented ignorance, these have introduced a gradual change in opinion and practice, by the presentation of new motives, and the creation of new desires. The first in point of time to excite the spirit of emulation, was the Highland Society of London, (the parent of the Caledonian Asylum) established by General Fraser of Lovat, and other native Highlanders, in the year 1778. Its objects were directed to the preservation of the language, music, poetry, and garb of the Highlands, and along with these some of the best traits of the ancient characteristics of the people.[a] It was followed by the association of a Highland Society at Edinburgh in 1784. The attention of this body is turned to the present state of the Highlands and Islands of Scotland, and the condition of the inhabitants; the means of their improvement by the erection of towns

[a] Col. Stewart's Sketches, I. 229.

and villages; formation of roads and bridges; advancement of agriculture, and extending of fisheries; introducing useful trades and manufactures; and an endeavour to unite the efforts of the proprietors, and the attention of government to these beneficial purposes.[a] The Society was also to pay a proper attention to the preservation of the language, poetry, and music of our mountaineers. "Faithful to the purposes of its institution, this Society has taken every opportunity of encouraging whatever tended to improve the cultivation of the country in general, and particularly of the remote and rugged region from which it assumed its name." It has been emulated in its labours by minor associations in different quarters of Perth, Ross, Inverness, and Argyle; some more immediately tending to the preservation of what was noble in the Highland clans,—their mutual attachment, garb, and love for their native soil; others again formed for the diffusion of agricultural knowledge. Of the former, the Celtic Society, founded in Edinburgh about seven years ago, may be accounted the most eminent. To its original objects, it has also added premiums to be given to the best scholars attending certain schools within the Highland boundary. As a voluntary military corps, it had the honour of having the regalia of Scotland intrusted to its charge on the occasion of his Majesty's visit in 1822. But the

[a] Introd. to Prize Essays of the Society, I. iii.

limits of an Essay such as this, preclude the particularising of each individual inroad on former apathy and prejudice. The town of Inverness, which may be considered the point from whence the rays of civilization shone over the surrounding gloom, may be selected as an instance of the rapid change in sentiment and manners since 1765. The manufacture of hempen cloths has been commenced; churches and chapels of various sects built; Missionary and Bible Societies established; schools endowed; markets regularly enclosed; an infirmary erected; a communication made with London and Leith by means of regular smacks; the harbour repaired, and a new one formed; a theatre opened; reading-rooms established; a proprietary subscription library set on foot; two newspapers published weekly, and various professional and philanthropic institutions founded. Till 1817, bargains for wool and sheep, were concluded at the various trysting places throughout the Highlands, and sometimes at the homes and fanks of the farmers. To do away with the inconvenience and expense of this method, a great annual sheep and wool market was established in Inverness in 1817. Here the whole fleeces and sheep of the north of Scotland are generally sold or contracted for in the way of consignment; and here the gentlemen who grow wool in the northern counties, and the respectable wool-dealers and manufacturers of England attend. In June, 1818, upwards of 100,000 stones of wool, and

150,000 sheep were sold at very advanced prices.[a] Agriculture has advanced with every other improvement. The old system has been almost completely abandoned. Under it a scanty and imperfect cultivation of corn was limited to trivial and detached patches of arable ground. Cattle were the main resources of the tribe—the acquisition of these the great object of their hostile forrays. The precarious crops gave them wherewithal to bake their oaten cakes, or distil their ale or whisky. When these failed, the crowded population suffered every extreme of misery and want. At one time in particular, in Sutherland, they were compelled to subsist on broth made of nettles, thickened with a little oatmeal:[b] At another, those who had cattle, to have recourse to the expedient of bleeding them, and mixing the blood with oatmeal, which they afterwards cut into slices and fried.

Under the ancient system, crops were produced either with, or without manure, as that could be procured.[c] The land was scourged by a repetition of grain crops, till it refused to bear any longer; weeds and spontaneous grasses were then suffered to accumulate for a series of years, till the ground gained such *heart* as fitted it for a renewal of the former exhausting process. The natural pastures, which were free to all the community, were at the same time overstocked

[a] Inverness Courier, 21st June, 1826.
[b] Loch's Sutherland Improvements, 77, 54.
[c] MacCulloch's Western Islands, I. 29.

by cattle, producing the inevitable consequences of numerous deaths every winter. A ludicrously large establishment of horses was kept up, for the momentous purposes of tillage; or, more properly speaking, for dragging their peats: their number too often augmented by the silly vanity of the cottars themselves. Farms were let to the whole body of tenants resident in each "town" in runrigg. The various subdivisions of the farm, passing into the hands of all the co-occupants in succession,—each person had only a *pro tempore* interest in the portion which he happened to hold, and had no prospective benefit to induce him to ameliorate it. Every individual was liable, not only for his own rent, but for that of all his neighbours,—the sober for the drunkard, the industrious for the profligate. And, to crown all, these poor people held their miserable lots, not of the proprietor, but as sub-tenants of a principal tacksman or middleman, under whom they were trammelled with numerous services independent of their rent. The first and most material change was the introduction of the potato. Requiring little labour in its cultivation, this valuable root was quickly adopted. During the prevalence of the ancient 'regime,' it nevertheless proved a curse, rather than a blessing, as an increased population and accumulated misery were the consequences; for, in proportion to the greater multitudes which this vegetable supported, when the crop was good, were the corresponding evils of

famine, when, by mildew or frost, it had been destroyed. When this calamity befell them, the starving people necessarily became dependent on the bounty of their chief. Unlike the peasant of the south, the common Highlander had no "kail yaird" to which he might have recourse for wholesome food; and, to this day, any culinary vegetable beyond the potato, is rarely to be met with, except in the fields of landlords and principal farmers. Turnips, pease, beans, grass seeds, and clover, are yet unknown in many of the western islands.[a]

To manifest the complete revolution, which in agriculture, as in every thing else, has taken place since the last rebellion, I will oppose to the sketch now drawn, a few circumstances which will speak for themselves. They are stated by me, on the authority of parties whose access to the sources of information, gives the best pledge for their accuracy.

The estate of Castlehill, belonging to the Cuthberts, an ancient family, (of whom the French Abbé Colbert, and the Bishop of Rodez, were cadets,) was brought to judicial sale, in, or about the year 1779, and was purchased for the family by their agent, for L.8000 sterling. It was exposed in lots, for debts due to Mr. Roberts, a London banker, in 1804, and sold for between L.60,000 and L.70,000 sterling. In 1787, the barony of Lentron, holding of the family of Fraser of Strichen, producing a trifling

[a] MacCulloch's Western Islands, I. 45, 31.

rental, and itself in a wretched state, was sold, after a competition, at L.2500 to a Mr. Warren; five-and-twenty years afterwards, he disposed of it to Major Fraser of Newton for L.20,000. Simon, Lord Lovat, sold the estate of Glenelg, in Inverness-shire, in 1620, to M'Leod of MacLeod for a few thousand merks Scots. In 1781, the rental of the same property was about L.600 sterling per annum. MacLeod sold it in 1811 to Mr. Bruce, banker in London, for L.100,000. It was previously exposed, towards the close of last century, for less than L.30,000. The lands of Ardnagrask, the property of Sir Hector M'Kenzie of Garloch, were put up to sale by warrant of the Court of Session in 1789: Rental, not L.30. They were purchased by John Rose, an excise officer, and considered high at L.1200. Mr. Rose never expended a penny on them, and sold them to his brother, Major Rose, for L.5000; who again turned them over in 1825, to Thomas M'Kenzie, Esq. of Ord, for L.6000 sterling. General Sir Alexander M'Kenzie of Fairburn, in Ross, succeeded, in 1787, to his paternal estate of *Fairburn*, which then only yielded a gross annual rental of L.700 sterling. He transferred a pendicle of this estate, called Moy, to M'Kenzie of Seaforth in 1791-92, for L.3500. A year or two afterwards, he disposed of other parts of his property for L.18,000. M'Kenzie of Ord, and Gillanders of Highfield, purchased another portion for about L.8000; and M'Kenzie of Lentron a further division for

L.3500. In 1813-14, the General sold an extensive grazing to Mr. Fraser of Eskadale, for L.9000 odds. After all these sales, he still retained the district of Strathconan, which itself, in 1802, yielded a rental of L.1700, when a new set was made. In 1824, this remnant of his *old* estate was sold by General M'Kenzie for L.40,000! making a grand total received for it, of L80,000. It should be mentioned this last part was entirely pasture land. In 1790, the property of Redcastle, in Ross, was sold judicially, and after a keen competition, purchased by Mr. Grant of Shewgley, for L.25,000, the gross rental being about L.1000 per annum. In 1824, the same estate was bought by Sir William Fettes, Bart. for L.135,000 sterling!! To account for so extraordinary an advance, I may add that this estate is adjacent to the town of Inverness; being washed by the Murray Firth, and having a fine southern exposure. But that it may be seen, that the rise in the value of land has not been confined to those districts, more immediately under the influence of the northern capital, it is sufficient to refer to what has been done by capitalists from the Lothians and Northumberland, on the Stafford estates in Sutherland. The beneficial influence of the spirited operations in that quarter, has also been felt through the most inaccessible parts of Lord Reay's country; where enclosures have been made, farm houses erected, and a rental of L.2000 increased to L.15,000. The estates of

"The Chisholm," situated in the romantic district of Strathglass, have risen, since 1785, from L.700 to be now upwards of L.5000 per annum. When Duncan Macdonald of Glengary died in 1788, his yearly income did not exceed L.800. The same lands now yield from L.6000 to L.7000.

Before the effects of so many combined advantages, whatever portion of the Highlands may remain under circumstances arising out of the feudal state, must speedily be freed. The Highland gentleman will no longer derive consequence from the mere circumstance of being able to boast of a long line of ancestry; public opinion will tell him that in these days, there is an aristocracy of talent, and of wealth, as well as of birth; and if unpossessed of either of these, he will carry little weight as a member of general society. As an unavoidable consequence, the Highlands must soon fall into that condition which is most conducive to the general welfare of the empire, and to which their domestic repose is particularly favourable. In fact, there is no country in Europe, where crimes are less frequent, or property more secure.

The last districts of the Highlands to feel the beneficial influence of that change, operating so powerfully in every other quarter, were the county of Sutherland, and the western parishes of Ross. Cut off by geographical position from all intercourse with the rest of the kingdom, or enabled only to communicate at the risk of life by dan-

gerous ferries, ill supplied with the means of navigation, the native of Sutherland must necessarily have had all his views bounded by a very narrow compass, scarcely extended indeed, beyond his native glen; from the difficulty of traversing a county destitute of roads, and intersected by rapid rivers and numberless lesser streams.[a] To this day the recesses of Loch-broom, on the western shores of Ross, are almost inaccessible from the want of roads; and the condition of the natives is one of the most deplorable ignorance.[b] It might naturally be expected, that the ideas of a patriarchal life would tinge the character of the people, and that the notions of supremacy in the ruler and subordination in the vassal remained in full force.[c] These feelings were cherished by the manner in which the Sutherland "family" regiment was formed, exhibiting the old distribution of laird, tacksmen, and tenants. They all claimed kindred with the chief, and looked upon the grant of a farm, or tack of land, as a necessary return for having forwarded his views by enlistment. Every tacksman paid the bulk of his rent by the number of men he could raise; and his son or his kinsman was promoted according to the recruits he furnished. Irregular in their habits, the men abandoned the heavy labour to the

[a] Loch, 20.

[b] Letter of Dr. Ross, App. p. 2. Moral Statistics by Inverness Education Society, 1826.

[c] Loch, 42, 47.

women, preferring the more exciting pleasure of the chase, or illicit distillation, to the drudgery of agriculture. When the Sutherland regiment was enrolled into the line, a complete revolution in its domestic economy, was the necessary consequence. But the people at home remained attached to the feelings of their fathers: To substitute, in place of these, habits [a] of regular and continued industry; to enable the inhabitants to bring to market, a considerable surplus quantity of provisions for the supply of the large towns in the south; and to make Sutherland the depository of wool for the staple manufactory of England, by converting the mountainous districts into sheep walks, and removing the population to the sea coast, or the valleys adjacent thereto; have been the objects of the extensive arrangements carried on by the Marquis and Marchioness of Stafford since 1819. The propriety of these arrangements has been questioned; but they have met with an able defender in Mr. Loch, whose excellent treatise will be read with interest, by all who remember, that Sutherland produced that gallant soldiery so deservedly commemorated by General Stewart of Garth.

With his improvement in a political sense, an important amelioration has also been effected in the domestic comforts, and mode of living, of the Highlander. Among all nations, the better ranks partake of a similarity of character.

[a] Loch, 73, 140.

In the modern Highland gentleman, we must expect the same shades which are to be found in his grade elsewhere. Whilst any actual authority over his tenants must be disclaimed, it cannot be denied that ancient remembrances, and remoteness of situation, place it more in his power to be the father, or the tyrant of his district, than in the well-peopled plains of the Lowlands, or sister country. But the same circumstances also contribute in the case of a considerable landlord, to cement the bond of social existence; whilst the diffusion of knowledge is every day advancing too rapidly, to cause apprehension from such a connexion, however dangerous in feudal times. So long as the relative duties of landlord and tenant are guided by fair and dispassionate principles, we may be assured, that should any emergency arise, and the thunders of Britain be heard, the superior will be followed to the field by men, for whose fidelity and good conduct, there will be a solid pledge in the families they have left, and the motives which animate them;—motives which the lash never can enforce.

"'Ne'er in battle-field throbb'd heart so brave,
As that which beats beneath the Scottish plaid;
And when the pibroch bids the battle rave,
And level for the charge your arms are laid,
Where lives the desperate foe that for such onset staid?"
SCOTT.

What the Highland soldier can do, the inhabitants of almost every clime may tell. Whe-

ther he was engaged on the burning sands of Egypt, on the plains of Italy, or the mountains of Spain; in the new world or in the old; he has well maintained the eulogium of the gifted Chatham: "I sought for merit wherever it was to be found: It is my boast that I was the first minister who looked for it, and found it in the mountains of the north. I called it forth, and drew into your service a hardy and intrepid race of men: They served with fidelity, as they fought with valour, and they conquered for you in every part of the globe."

In what remains to be effected for the Highlands, we may be permitted to hope, that a speedy abolition of the disgusting practice of carousing at funerals, will be among the first improvements in society.

The ceremonies of interment were, however, so singular, that I may be pardoned the wish of rescuing from oblivion, a few of the fleeting memorials which are now passing away from us. A rapid survey of some of the funeral rites among various people, may not at the same time be uninteresting by way of preface; as tending to establish many striking points of similarity between the nations of antiquity, and the Highlanders of Scotland.

The most ancient mode of disposing of the dead was by committing the body to the earth. In this way did the patriarchs act;[a] Jacob, and

[a] Gen. xlvii. 29, 30; xlix. 30, 31.

his son Joseph only, were embalmed.[a] Among their descendants the Hebrews, it was customary for the friends of the deceased to rend their clothes, and cover their head with ashes. "Rend your hearts, and not your garments," is an expression of holy writ. The Jews had no defined places of interment. They buried in mountains,[b] in gardens,[c] and on highways. Every traveller must remember, that the tombs of the old Romans are beyond the city walls.

Burning before tumulation, seems to have succeeded simple interment, from a desire of preventing indignities by enemies, to those who fell in battle. The body carefully washed and anointed, was laid on the funeral pyre, over which the attendants threw handfuls of their hair.[d] Into the pyre were cast the arms of the deceased, the spoils of the foe, and the presents of the bystanders.[e] From burning and raising a pile over the dead, the transition to barrows seems inevitable: And this custom, derived by the northern nations from Greece and Rome, was rendered imperative by a law of Woden. We next perceive a rude stone, inscribed with Runic characters, surmounting the tumulus; hence engraved tombstones among ourselves. To the Egyptian, the form of the pyre suggested the towering pyramid.[f]

[a] Gen. l. 2, 26.
[b] Matthew xxvii. 60.
[c] John xix. 42.
[d] Homer, lib. xxiii.
[e] Strutt, I. 53. Ezekiel xxxii. 27.
[f] Forsyth's Italy, 148.

The veneration with which the ancients viewed their places of sepulture, has been thought to have laid the foundation of their boundless mythology,[a] and introduced their belief in national and local tutelary deities; and the same feeling induced the old Highlander to wave his broad sword in the air for the ghost of a relative, at any sudden gust of wind.[b] To insure the entrance of the departed into the blessings of an after-state,[c] it was held a sacred obligation on travellers, if they met a dead body, to cast mould or dust on it three times; and of these three handfuls, one at least, was poured upon the head. So in the Highlands, every passer by, threw a stone upon the resting place of their friends, or of those, whose silent house they encountered in the pathless wilds of their mountains. "I will add a stone to your cairn," was an expression implying the most attached affection. The funeral rites (so denominated from the torches borne on such occasions by the Romans) were extremely numerous among that people:[d] But the prognostics of death among all mankind seem to have been lights or flambeaux. At the door were placed branches of pine and cypress,—and hence the mutes of modern days stationed at the entrance of a dwelling, with black plumes mounted on poles.[e] The corpse laid on a bed of purple,

[a] Fosbrooke, Ency. Antiq. I. p. 64. [b] Ibid. II. 548.

[c] Homer, lib. xxiii. Ency. Brit. III. 781. Virgil, lib. x. verse 904.

[d] Ency. Brit. VII. 501. [e] Ency. Ed. X. 34.

was preceded by a trumpeter, and bands of old women, styled *præficæ*, hired for the occasion, who intermingled the praises of the dead with wailing for his loss.[a] Before the pyre was lighted, the next of kin mounted the rostrum, and eulogised his relation's merits; and in like manner, when the paroxysms of their grief had subsided, the Highland women sung the praises of the deceased.[b] This done, the pile was set fire to, and the people took their departure with the affecting expression, "Vale, vale, vale, nos te ordine quo natura permiserit, sequemur." To render the last duties more imposing, prisoners of war were sometimes sacrificed to appease the manes of the dead. Thus Achilles cut the throats of several Trojan captives at Patroclus' funeral. Wives and slaves were slain, with the favourite horse of the warrior, to conduce to his comfort in his new abode. In Dalmahoy, an African state, the king annually "waters the graves of his ancestors" with the blood of thousands to this day.

Among both Greeks and Romans, a feast followed the interment; by the latter styled *Silicernum;* and the custom was of universal prevalence over the East also.[c] The northern English

[a] Like the *ululatus* of the Romans,—the *coronach* of the Highlanders, and the *ulaloo* of the Irish, was the mournful token of bereavement. "In their streets they shall gird themselves with sackcloth: on the tops of their houses, and in their streets, every one shall *howl*, weeping abundantly."—(Isaiah xv. 3.)

[b] M'Pherson's Dissert. on Caledonians, 302.

[c] Homer, b. xxiii.

serve up arvil bread to this day. In southern Scotland, they drink the dirge of the dead; and in the Highlands, this always was held in the deceased's own house. In many parts of Britain, a passing bell was rung for a person expiring, and is so still in the Highlands. *Lyke wakes* held there sometimes for nights together before the funeral; a platter of salt was placed on the corpse, with candles about it, and a scene of debauchery ensued, with its concomitant attendants of singing and dancing. In Inverness and other towns and villages, the bells of the church tolled all the time the corpse was above ground, quarter chimes. The bellman went round and proclaimed the death in these terms: "Brothers and sisters, this is to let you know, that a brother is departed, called to his name ———. You are requested to come to his funeral to morrow at ———, and do unto him as you would wish to be done with." The same mode is adopted in Holland, where the announcement is, "mak bekend that overladen is." All the friends of the deceased becomingly dressed, were in use also to wait on the inhabitants, and request their attendance. A printed circular now supplies the annoyance of this ceremony.

I shall next proceed to call out a few other circumstances attendant on some of the more remarkable Highland funerals of the last hundred years. I pick them at random; not even arranging chronologically. One remark only will I

make;—that the consequent feast, so ancient, and among rude tribes still so universal, may be typical of joy for the escape of a soul from this region of care. Whether the idea be correct or not, I have heard it said, that to the christenings, marriages, and burials of their forefathers, many Highland families may fairly ascribe the mortgages which at present impoverish their estates.

Lachlan M'Intosh of M'Intosh died in 1704. The funeral feasts and entertainments were kept up for an entire month. Cooks and confectioners were brought from Edinburgh at great expense; and on the day of interment, the procession extended from Dalcross Castle, to the churchyard of Petty, a distance of four miles! It has been said, that the expense incurred on this occasion, proved the source of the pecuniary embarrassments of the M'Intosh family to a recent period.

In September, 1816, when George M'Kenzie of Dundonald died, a vast concourse of people brought the body from Inverness, to the family burial place in Lochbroom, over wilds and mountains even yet, almost impassable. The cavalcade left Inverness, on 2d October, 1816; had regular halting places every night, where deep and inspiring potations of whisky and wine were quaffed; independent of the drams drunk every five miles, by way of giving breath and spirit to the attendants. Four days were consumed in this way; and, upon approaching the

estate of the deceased, an additional band of mourners joined the procession. Many of them were women, and the *coronach* was raised perhaps for the last time, in modern history. The funeral or last feast was worthy of the rest of the ceremony, and the wine-cup passed rapidly around.

At the funeral of M'Kenzie of Red Castle, (who was collector of customs in Inverness) in May 1785, I have been assured, that from the ferry of Kessock to the house of Red Castle, a distance of four miles, a row of clansmen occupied either side of the road. Five hundred of these, were retainers of Seaforth; the others came from the estates of Lovat, Chisholm, Kilcoy, Allangrange, and the different quarters of Ross. Numerous pipers played the wild, yet melancholy "lament" customary on such occasions. A grand dinner terminated the day.

William Chisholm of Chisholm, died at Bath, in March 1817. His corpse was sent to Inverness by sea, and lay in state there for several days, in one of the inns; where wines and refreshments were laid out for all visitors; after which it was removed to the family burial place in Beauly priory, attended by almost the entire population of the town. The tenants of the deceased met the funeral procession at Beauly Bridge, resolved on removing their chief from the hearse, and carrying him on their shoulders; but the coffin being a leaden one, they were glad to desist from their

purpose. A granary adjacent to the priory, was the scene of the banquet after the interment. The company were so numerous, that it was apprehended the floor would have given way. Those of "gentle kindred" occupied the upper room, whilst the commons caroused in the lower storey. To use a rude but familiar phrase,—the claret ran like ditch water—and the old women of the village brought pails to carry off the superfluous whisky, when those, for whom it was designed, could drink no more; nay, further, the voice of scandal has hinted, that every one of them kept public house for six months afterwards, from the relics of the feast. When the fiery beverage had inflamed their blood, the tenants, indignant at being debarred from tasting the claret, made an irruption into the quarters of the more favoured class, but were easily repulsed. Night closed on the revellers; several of whom (if my information be correct) were to wake no more; for a sharp fall of snow overpowered individuals of the senseless and straggling people. On rising in the morning to claim their horses, some of the gentlemen were astonished to find that the flaps of their saddles had been cut off, the Highlanders having discovered they would make excellent brogues! and made free with them accordingly.

At the interment of the Honourable Archibald Fraser of Lovat, in 8th December, 1815, a sumptuous entertainment was given. The gentlemen filled every apartment in the house;

the tenants were upon the green; claret and every other wine abounded to the first,—whisky to the last. The procession left the castle of Beaufort, by torchlight late in the evening, for the chapel of Kirkhill, after ample justice had been done to the flowing bowl. Some thousand clansmen attended, as did the widow of the deceased. Several of the lower order tumbled into the vault intoxicated, and were hauled out next day when the smith came to close the door.

The funeral of Sir Æneas M'Intosh of M'Intosh, in January 1820, was conducted in truly feudal style: nor was that of Colonel Hugh Grant, who died at Moy near Forres in 1823, and was thence carried to Urquhart, one iota less so.

And now, turning from the spectacle of feudal manners, venerable from antiquity, and doubly attractive through the magic colouring of fancy, let us hail the important consequences, to be anticipated from the future labours of the Northern Institution for the Promotion of Science and Literature, established at Inverness on the 8th March, 1825. In the class of desiderata attached to the "Memorabilia of Inverness" as yet practicable, or useful, there occurs a recommendation for the foundation of some such public body. "To those," says the writer, "who may ridicule the project as too extensive, and too extravagant, we would suggest the recollection of the numerous improvements accomplished among us during the past thirty years." The objects of the institution are such

as are every way consistent with the rapid advancement of our countrymen; and its founders are entitled to merited praise. Their views point to no Utopian scheme: they contemplate the promotion of science and literature in general; the investigation of the former history of Scotland, and of the Highlands in particular: They call upon the lover of science to unfold her stores, and they afford a protecting shield to the child of genius, in works of art. Where is the Highlander who can remain deaf to the appeal? Where is the native who can listen with indifference to a call, which, if answered, may elevate his countrymen to a distinguished rank in the list of the benefactors of mankind? which may entitle the Scottish mountaineers hereafter, to be as marked for their extensive knowledge, and liberal attainments, as they were heretofore in ages of civil commotion, distracted by internal discord, and bent down by feudal oppression. With the names of those, who by literary eminence have shed a lustre over the Highland horizon, it were but justice to conclude this paper. They will admit of a twofold classification:[a] in the first we may rank Monro, dean of the isles; Sir George Mac-

[a] It were conferring additional honour on my country, could I add that her rugged soil had given birth to Mrs. Grant of Laggan, to Henry Mackenzie, to Thomas Campbell, and to Hector M'Neill. If my information be correct, the authoress of many interesting works upon the Highlanders, though of Highland extraction, was born in America: The Scottish Addison first drew breath in the Cowgate; Glasgow lays claim to Campbell; and M'Neill sleeps in his native Roslin.

kenzie the eminent lawyer; George, first earl of Cromarty; Dr. George Mackenzie; Duncan Forbes, Lord President of the Court of Session, and the Macphersons. In the second, Sir James M'Intosh; the three Stewarts, the learned translators of the Bible into Gaelic; Evan Maclauchlan, M. A. of Aberdeen, a native of Knoydart, and the conductors of the Gaelic dictionary; Sir George M'Kenzie of Coul; Mr. Grant of Corrimony; Mrs. Grant, Duthel; and General Stewart of Garth. And in the list of those who have studied to diffuse the blessings of civilization, let not the memory of Sir James M'Donald of Macdonald be forgotten; a man, whose early demise, at the age of twenty-five, excited the regret both of his countrymen and foreigners, and blighted the hopes of the many improvements, which his fruitful genius had suggested, "under the sober direction of a clear and enlightened understanding."[a]

What he longed to behold has arrived: a new era has opened on our mountains; the barriers which have closed the avenues to knowledge exist no more. The diffusion of education and intelligence will awaken the spirit of honourable enterprise, and, in the words of a living poet,

"There are hearts, prophetic Hope may trust!
That slumber yet in uncreated dust,
Ordain'd to fire th' adoring sons of earth
With every charm of wisdom and of worth;
Ordain'd to light, with intellectual day,
The mazy wheels of Nature as they play,
Or, warm with Fancy's energy, to glow,
And rival all but Shakspeare's name below!"

[a] Doug. Peer. II. 15.

APPENDIX.

APPENDIX.

No. I.

LIST

OF THE

HONORARY MEMBERS OF THE NORTHERN INSTITUTION.

WITH THE DATES OF THEIR ELECTION.

1825.

March 23.—Samuel Hibbert, Esq. M.D. one of the Secretaries to the Society of Scottish Antiquaries.

James Tulloch, Esq. Professor of Natural Philosophy, King's College, Aberdeen.

Thomas Telford, Esq. F.R.S. Civil Engineer.

Dr. Jackson Hooker, Professor of Botany in the University of Glasgow.

Alexander Nimmo, Esq. Civil Engineer, formerly Rector of the Inverness Royal Academy.

Robert Grant, Esq. Barrister, London.

Right Hon. Sir John Sinclair of Ulbster, Bart.

April 29.—Sir James Mackintosh, M.P. Knight.

James Grant, Esq. of Corrymony.

Rev. William Buckland, B.D. Professor of Mineralogy and Geology in the University of Oxford.

Sir Walter Scott of Abbotsford, Bart.

September 16.—Sir James Macgregor, F.R.S. London and Edinburgh, Director General of the Medical Department in the Army.

James Trail, Esq. F.R.S., &c. &c. Liverpool.

Thomas Thomson, Esq. M.D. &c. &c. University of Glasgow.

Andrew Ure, Esq. M.D. F.R.S., &c. &c. Andersonian Institution, Glasgow.

Robert Jameson, Esq. Professor of Natural History in the University of Edinburgh, &c. &c.

David Brewster, Esq. LL.D. Edinburgh.

October 18.—General David Stewart of Garth.

Isaac Forsyth, Esq. Bookseller, Elgin.

William Couper, Esq. M.D. Lecturer on Mineralogy in the University of Glasgow.

December 30.—Captain Parry, R.N.

Adam Anderson, Esq. F.R.S., &c. &c. Rector of the Perth Academy.

John MacCulloch, Esq. M.D. F.R.S., Chemist to the Board of Ordnance, &c. &c.

1826.

January 27.—James Trail, Esq. Sheriff-Depute of the County of Caithness.

February 24.—Henry Mackenzie, Esq. Comptroller of Taxes for Scotland.

June 27.—R. E. Grant, Esq. M.D. F.R.S., &c. &c. Edinburgh.

William Ritchie, A.M. Rector of the Academy at Tain.

Charles Waterton, Esq. of Walton-Hall, Yorkshire.

The Rev. John Fleming, Minister of Flisk.

Charles Edmonstone, Esq. of Cardross Park, near Dumbarton.

Captain Carmichael, Appin.

October 27.—General H. Hutton, Inspector General of Fortifications.

Colonel Ronaldson Macdonell of Glengary and Clanranold, &c. &c.

Dr. Robert Thomson, F.R.S., York Terrace, London.

December 28.—John Gregorson, Esq. of Ardtornish, Sheriff Substitute of Argyleshire.

No. II.

CORRESPONDING MEMBERS.

1825.

March 23.—Rev. Charles Clouston, Stromness, Orkney.

John Coldstream, Esq. M.W.S., &c. Leith.

John Turnbull, jun. Esq. Merchant, Glasgow.

William Robertson, Esq. Brora, Sutherlandshire.

D. Morison, jun. Esq. Secretary to the Literary and Antiquarian Society of Perth.

Rev. William Dunbar, Schoolmaster, Duthil.

Rev. Hugh Urquhart, Montreal, North America.

Robert Armour, Esq. Montreal.

Gregor Urquhart, Esq. Portrait Painter of Inverness, now at Rome.

James Hopkirk, Esq. Advocate, Edinburgh.

J. G. Hamilton, Esq. Portrait Painter and Draftsman to the Institution.

April 29.—Lieutenant Skene, R.N. Inverness.

Lieutenant John Macbean, H.E.I.C.S., of Inverness.

Captain James Macdonald, Floddigary.

Dr. Donald Smith Young of Inverness, Arungabad.

Walter Bethune, Esq. Van Dieman's Land.

James Matheson, Esq. Vice Consul, Canton, China.
Thomas Rankin, Esq. of Inverness, Surgeon, Bombay.
John Fraser, Esq. Merchant, Madras.

April 29.—George Biddel Airy, Esq. Trinity College, Cambridge.
James Parker, Esq. Trinity College, Cambridge.
Dr. William MacIver, Stornoway.
George Miller Sinclair, Esq. Gilmour Place, Edinburgh.

September 16.—The Rev. Michael Russell, LL.D., Leith.
James Macpherson, Esq. Rotterdam.
John Macpherson, Esq. Merchant, Glasgow.
The Rev. Donald Leitch, Missionary Minister, Gairlochy.
Charles Macdougall, Esq. Advocate, Edinburgh.
Rev. Thomas Macfarlane, Edinkillie.

October 28.—Charles Lush, Esq. M.D. Lecturer on Botany, St. Thomas' Hospital, London.
Rev. David Ritchie of Tarbolton, Ayrshire.
Alexander Denoon, Esq. London.
Allan Kerr, junior, Esq. Greenock.
P. B. Henderson, Esq. M.D. Scotcalder, Caithness.

November 25.—John Murray, Esq. Stranraer, F.R.S. &c. &c. Lecturer on Chemistry.

1826.

January 27.—Lieutenant George Mackenzie, Cyderhall, Sutherlandshire, (Author of the Cycle of the Weather.)
William Hutton, Esq. Newcastle.
John Traill Urquhart, Esq. Advocate, Orkney.
Lieutenant Campbell, R.N. Captain of the Ben Nevis Steam Packet.

April 1.—Rev. William Steven, presently at Glenmoriston.

June 27.—John Mackintosh, Esq. M.D. Berbice.
William MacGillivray, Esq. A.M. M.W.S. Deputy Keeper of the Museum, University, Edinburgh.
The Rev. John Macvicar, Professor of Natural History, University of St. Andrews.
October 27.—Mr. Peter Swany, Reiss Lodge, Caithness.
Mr. A. D. Mathewson, Schoolmaster, Yell, Shetland.
December 28.—Major Phineas Macpherson, late of the 35th Regiment of Foot, Barbadoes.
Dr. D. Maclean of Oban, Argyleshire.
Mr. William Fraser, (late of Inverness) Watchmaker, London.
Dr. John Leonard Freeman, Arungabad.

No. III.

ORDINARY MEMBERS.

1825.
March 8.—James Robertson, Esq. M.D. Provost of Inverness.
The Rev. Alexander Rose, D.D. Inverness.
The Rev. Alexander Clark, Inverness.
The Rev. Charles Fyvie of St. John's Chapel, Inverness.
Alexander Mackenzie, Esq. of Woodside.
Alexander Shepperd, Esq. Solicitor, Inverness.
Robert Logan, Esq. Agent for the British Linen Company, Inverness.
Mr. Peter Scott, Teacher of the Humanity Class in the Academy of Inverness.
Bailie John Fraser, Agent for the Perth Bank, Inverness.

Mr. Joseph Mitchell, Parliamentary Road Inspector, Inverness.
James Suter, jun. Esq. Merchant.
Mr. Alexander Forbes, Druggist.
Mr. Hugh Fraser, Surgeon, Inverness.
Roderick Reach, Esq. Solicitor.
Mr. Robert Naughton, Jeweller.
Mr. John Mackintosh, Solicitor.
Mr. James Wilson, Solicitor.
George Anderson, Solicitor, F.R.S.E. F.S.S.A.

March 23.—His Grace the Duke of Gordon.
Sir Thomas Dick Lauder of Fountainhall and Grange, Bart.
William Fraser Tytler, Esq. Sheriff-Depute of Inverness-shire.
Sir George Steuart Mackenzie of Coul, Bart.
Rev. Robert Findlater, Inverness.
Rev. James Scott, Inverness.
Rev. Donald Fraser, Kirkhill.
John Mactavish, Esq. Solicitor.
John Thomson, Esq. Solicitor.
John Inglis Nicol, Esq. Inverness.
Alex. Mactavish, Esq. Solicitor.
Neil Maclean, Esq. Landsurveyor.
Mr. R. B. Lusk, Bookseller.
Edward Atkins, Esq. of Inverness.
John Mackay, Esq. Solicitor.
Rev. Duncan Mackenzie, Episcopal Minister, Fortrose.
Andrew Belford, Esq. Solicitor.
Colin Chisholm, Esq. Solicitor.
James Grant, Esq of Bught.
Dr. Alex. Macdonald, Inverness.
Mr. George Suter, Inverness,
William Mackintosh, Esq, of Geddes, M.D.
William P. Grant, Esq. younger of Rothiemurcus.

Captain Thomas Fraser of Balmain, formerly of King's College, Cambridge.
James Murray Grant, Esq. of Glenmoriston.
Robert Macbean, Esq. Solicitor.
April 29.—John Edwards, Esq. Solicitor.
Rev. Edward Elton Chaundy, Somersetshire.
William Mackintosh, Esq. of Millbank, Nairn.
Rev. Robert Milne, Chaplain, Fort George.
Rev. Donald Mackenzie, Fodderty.
William Hughes, Esq. Civil Engineer, Inverness.
James Davidson, Esq. Civil Engineer, Clachnaherry.
Mr. David Denoon, Solicitor, Inverness.
Mr. Robert Maclean, Portrait Painter, Inverness.
Mr. Eneas Mackintosh, Solicitor, Inverness.
Duncan Grant, Esq. younger of Bught, W.S. Edinburgh.
Henry Fraser, Esq. of Achnagairn, Queen's College, Cambridge.
John Ross, Esq. of Berbice.
Mr. James Mackenzie, Inverness.
Sept. 16.—James Alex. Stuart Mackenzie, Esq. of Seaforth, &c.
James Macpherson, Esq. of Belleville.
George Simson, Esq. Solicitor, Inverness.
Mr. John Mactavish, Inverness.
Alex. Inglis Robertson, Esq. younger of Altnaskiach.
Major William Mackay, residing at Hedgefield, near Inverness.
James Watson, Esq. Collector of Excise, Inverness.
John Macandrew, Esq. Solicitor, Inverness.
Henry Welsh, Esq. Fort George.
Donald Mackintosh, Esq. W.S.
John Anderson, Esq. W.S.
Charles C. Ross, Esq. younger of Shandwick.

The Rev. David Fraser, Dores.

Oct. 28.—Colonel James John Mackintosh of Farr, H. E. I. C. S.

Nov. 25.—Robert Smith, Esq. Soliçitor, Inverness.

Duncan Davidson, Esq. younger of Tulloch, M.P.

Dec. 30.—John Mackenzie, Esq. Writer, Tain.

1826.

Jan. 27.—Bailie John Ferguson, Inverness.

George Cameron, Esq. Solicitor, Inverness.

Feb. 24.—John Mackenzie, Esq. Agent for the Bank of Scotland at Inverness.

John Fraser, Esq. Croyard, near Beauly.

John France, Esq. Groam of Annat, near Beauly.

James Tomlie, Esq. Surgeon Campbelton, Fort George.

Lieutenant Clodius Kerr, H. E. I. C. S. Inverness.

Peter Anderson, Esq. Inverness.

March 31.—Charles L. Robertson, Esq. Inverness.

William Stewart, Esq. Sheriff-clerk Depute of Inverness-shire.

Lauchlan Cumming, Esq. Surveyor of Customs at Inverness.

April 1.—Robert Smith, Esq. of Delmore, Bailie of Inverness.

Mr. William Forbes, Student of Medicine, Inverness.

June 27.—Captain Simon Fraser, Inverness, author of the Airs and Melodies peculiar to the Highlands and Isles, &c.

Thomas Fraser, Esq. younger of Eskadale.

James Macgregor, Esq. Writer in Fort William.

R. Maclauchlan, Esq. M.D. Inverness.

Donald Fraser Mackenzie, Esq. Solicitor, Inverness.

Oct. 27.—The Right Honourable Charles Grant, Member of Parliament for the County of Inverness, Vice-President of the Board of Trade, &c.

Robert Grant, Esq. M.P. Barrister, London.
Hugh Monro, Esq. of Novar.
Hugh Rose, Esq. of Glastulich.
Alexander Mackenzie, Esq. Factor on the estate of Lovat.

Dec. 28. James Grant Manford, Esq. Solicitor, Inverness.
John Macqueen, Esq. late of Inverness, now of London.

No. IV.

COMMUNICATIONS

READ AT MEETINGS OF THE NORTHERN INSTITUTION.

First and Second Sessions, 1825—26.

April 29, 1825.—I. Account of a Stone Coffin, Druidical Circle, and Rocking Stone, on the farm of Blackhills. By Æneas Falconer, Esq. Blackhills, Nairnshire.

II. Notice regarding a Stone Coffin opened on the estate of Leys, the Urns found in which are now in the Museum. By Mr. Anderson, General Secretary.

III. Remarks on a curious Marriage Contract, dated in 1681, in the author's possession; copy deposited in the Museum. By Mr. Anderson.

IV. Catalogue of a Series of Historical Papers connected with the Highlands, of the 17th century. In the possession of the Reverend C. Fyvie, Inverness.

Sept. 16.—V. Original Letter of Simon, Lord Fraser of Lovat. Presented by John Anderson, Esq. W. S.

VI. Memorandum of Evidence taken by the Laird of Glenmorison, regarding the sudden Agitation of Loch Ness, on the 7th November 1755. Communicated by Mrs. Grant, Duthil.

VII. Account of a Subterranean Building, recently discovered in Glenshiel. By Mr. J. Mactavish, Solicitor.

VIII. Remarks on an ancient Cocquet, or Custom-House Seal of the Burghs of Inverness and Cromarty, found some years ago on the sea-shore at Aberdeen. By Mr. Anderson, General Secretary.

Oct. 28.—IX. Description of Sections recently made by order of T. A. Fraser, Esq. of Lovat, on Dun Fion, a Vitrified Fort on the Banks of the river Beauly; accompanied with specimens of the charcoal and animal bones found within the structure. By John Fraser, Esq. Croyard.

X. Account of the Sufferings of Mrs. Erskine of Grange, commonly called Lady Grange, from a manuscript, written partly by herself, and partly by the minister of St. Kilda. By Sir George Mackenzie of Coul, Bart.

Nov. 25.—XI. Sketch of the History of Caithness. By P. B. Henderson, Esq. of Scotscalder, M. D.

XII. Copy of a curious Letter from the Laird of Lochiel to the Laird of Grant, dated 18th October 1645, regarding a raid of the Camerons into Murrayland. Presented by Robert Grant, Esq. of Kincorth.

XIII. Letter from Provost Hossack of Inverness, to the Laird of Auchnagairn, regarding the Capture of the Castle of Inverness, for the Hanoverian family, by Simon Fraser, afterwards Lord Lovat, dated 13th

November 1715. By Henry Fraser, Esq. Auchnagairn.

XIV. Notice of a search for Lead Ore, in a vein of heavy spar, recently made by Lovat, in Strathglass. By Mr. Anderson, General Secretary.

Dec. 30.—XV. Observations on the Geology of the East Coasts of Ross and Cromarty shires. By Sir George Mackenzie of Coul, Bart.

XVI. On the ancient Coinages of England and Scotland. By Mr. Naughton, Curator of the Museum.

January 27, 1826.—XVII. Part First of an Essay on Architecture, by Mr. Mitchel, Parliamentary Road Inspector.

XVIII. Transcript of a scarce document, being a Letter (printed at Bath in 1750,) from a gentleman in London, to his friend in Bath, regarding the conduct of the Duke of Cumberland and the Royal Troops, after the battle of Culloden. By the Reverend C. Fyvie.

February 24.—XIX. Protection to the Lands of Eskadell, and Passport from the Duke of Cumberland to Mr. William Fraser of Agais, 11th July 1746. Presented by H. Fraser, Esq. of Eskadale.

February 14.—XX. Exposition of part of the System of the Weather. By Lieutenant George Mackenzie, Cyderhall, Sutherlandshire.

XXI. Notice respecting the occurrence of a Vertebral Bone of a Whale, found in a bed of gravel in the Glebe of Nairn. By William M'Intosh, Esq. of Millbank.

XXII. No. I. of a Series of Papers on Highland Antiquities; (1.) on Stone Circles and Cairns. By Mr. Anderson, General Secretary.

March 31. XXIII. Sketch of the Progress of Me-

teorology. By John Coldstream, Esq. Leith, M.W.S. Corresponding Member of the Northern Institution, &c.

XXIV. On the Origin of the local Name and Surname of Cunningham. By the Reverend David Ritchie, Edinburgh, Corresponding Member of the Institution.

October 27.—Essay on the State of Society and Knowledge in the Highlands of Scotland, at the period of the Rebellion in the year 1745, and of their progress up to the present time. By John Anderson, Esq. W. S. author of the History of the Frasers. Sir George S. Mackenzie's Gold Medal was awarded to the writer, for this Essay.

December 1.—On certain Meteorological and Electrical Phenomena which have given rise to many superstitions among the vulgar, especially in the Highlands. Illustrated by experiments. By John Inglis Nicol, Esq. Inverness.

December 28.—Communications on Apparitions, illustrated by an account of a Vision, reported to have been seen in the neighbourhood of Inverary, towards the close of last century. From Sir Thomas Dick Lauder, Bart. &c.

No. V.

LIST OF DONATIONS PRESENTED TO THE NORTHERN INSTITUTION,

From 23d March 1825, to 28th December 1826.

Donations.	*Names of Donors.*
1. A set of Minerals; Specimens of cloth made of the bark of trees in the southern hemisphere.	Mr. R. B. Lusk, Bookseller, Inverness.

Donations.	*Names of Donors.*
2. Scull of the Seahorse from Hudson's Bay; Ditto of the Polar Bear; Model of an Esquimaux Canoe; Esquimaux Dress; Knife; Bow and Dart; and Specimens of Spongia dichotoma; Orkney.	The Rev. Charles Clouston, Stromness, Orkney.
3. Series of the organic remains, and varieties of coal occurring in the coalfield of Brora, Sutherlandshire; Specimens of the scorified matter from vitrified forts in Inverness and Ross-shire, and ancient brass broach.	Mr. Anderson, General Secretary.
4. Thirty-two varieties of ancient English and Scottish Coins; An Andrea Ferrara Sword.	Mr. Naughton, Curator of the Museum.
5. Collection of Jacobite Papers; Urquhart's Tracts; Bacon's Natural History; History of the Rebellion of 1745, and Miscellaneous Papers.	Mr. R. B. Lusk, Inverness.
6. Series of Coins; Copy of the Vulgate, Antwerp, 1587; Copy of Quintilian, Paris, 1542; Cicero de Oratore, Venice, 1546; Eupheus' Golden Legacy.	James Suter, junior, Esq. Inverness.
7. Two brass Battle Axes; Head of a Spear; and brass Medal.	Alexander Tolmie, Esq. Glasgow.
8. Kamtschatka Comb; Chinese Portable Eating Implements and Money Balance.	Mrs. Captain Innes, Forres.
9. Etchings of remarkable Carved Stones in Ross-shire.	D. D. C. Petley, Esq. through Sir George S. Mackenzie, Bart.
10. Stuffed Pheasant and Badger.	Captain Park, Inverness.
11. Pair of Bishop's Gloves, found in a crypt in the Cathedral of Fortrose; Silver Coin of Edward VI.	Rev. Charles Fyvie, Inverness.
12. Copy of the Culloden Papers.	Mr. Tait, Perfumer, Inverness.

Donations.	*Names of Donors.*
13. Copy of the Public Records of Scotland, viz. the Acts of the Parliament of Scotland, in 10 vols. folio; the Retours of Services, 3 vols. and Register of the Great Seal, 1 vol.	Thomas Thomson, Esq. Advocate, Depute Clerk Registrar.
14. Two Sepulchral Vases from a stone coffin opened in the Leys, near Inverness.	Colonel J. Baillie of Leys.
15. Ancient Highland Implements of Household Economy; Silver Coin, and work on Natural History in MS.	Rev. D. M'Kenzie, Gaelic Secretary to the Institution.
16. Relics from the Tombs and Mummy Cases of Thebes.	Mr. Anderson, General Secretary.
17. North American Bow and Arrows; Tomahawk; Indian Flag; and New South Wales Paddle.	Major W. Mackay, Hedgefield, Inverness.
18. Key found in the rubbish of an encampment in the Aird; Pair of Hudson's Bay Boots and Shoes.	Mr. D. Fraser, Telford Street, Inverness.
19. Orkney Shearing Hook.	Eneas Falconer, Esq. Blackhills, Nairnshire.
20. Calabrian Bagpipe.	Mr. R. Maclean, Portrait Painter, Inverness.
21. Portion of an ancient Record of Inhibitions in the Shire of Ross.	Mr. James Mackenzie, Inverness.
22. Stuffed Badger and Fox.	Mr. Mackay, Cradlehall, near Inverness.
23. Specimens of the Skins and Horns of native and foreign animals; Variety of Shells, and Indian Bows and Arrows.	Dr. A. Macdonald, Inverness.
24. Coronation Medal of Henry V.	Mr. J. Mackintosh, Solicitor, Inverness.
25. Silver Coins, found at Boleskine, in 1787.	Mrs. Grant, late of Duthil, Nairn.
26. Series of Roman, British, and Spanish Silver and Copper Coins;	Miss Fraser of Achnagairn.

Donations.	*Names of Donors.*
Vegetable products of the West Indies; Rattle and other Snakes and Insects from North America, Africa, and the North of Scotland; and collection of the Dresses and Weapons of the North American Indians.	Miss Fraser of Achnagairn.
27. The Edinburgh Journal of Science, Nos. I. II. III. and IV.	The Rev. Mr. Scott, Inverness.
28. Treatises on Optics, Hydrodynamics, Electricity, and on Philosophical Instruments.	The Author, David Brewster, Esq. LL.D. &c. &c.
29. The Chair which formerly stood in the pulpit of the old Gaelic chapel of Inverness.	Mr. John Macleod, Bookseller, Wooler.
30. Four old Coins.	Major W. Mackay, Hedgefield.
31. Series of Shells.	A Lady.
32. Skin of a Boa Constrictor, twenty-four feet long; Horn of the extinct British Elk, found in digging out the foundation of a house in Inverness.	James Robertson, Esq. M.D. Provost of Inverness.
33. Model of a West Indian Hut, with Furniture, &c.; Ancient view of the town of Inverness.	James Fraser, Esq. of Belladrum.
34. Beautiful flint Arrow Head found at Kinmylies near Inverness.	Mr. J. Fraser, junior, House Painter.
35. Shell of the Green Turtle. Testudo Mydas.	R. Reach, Esq. Solicitor, Inverness.
36. History of the Family of Frizel or Fraser, by John Anderson, Esq. W. S.	The Author.
37. Curious antique scriptural Prints; Ten foreign silver Coins; Four copper Ditto.	J. Inglis Nicol, Esq. Inverness.
38. Medallion of Prince Charles, 1745.	Miss D. Macfarlane, Inverness.
39. Asbestos from Corsica.	A Lady.

Donations.	*Names of Donors.*
40. The Black Tarantula; Tail and Sting of the Sting-Ray Fish; Mangrove Oysters.	H. Fraser, Esq. of Kingilly.
41. Beautiful specimen of Scotch Agate.	Mr. William Anderson, Inverness.
42. Three Copper Coins, found among the sand hills of Coubin; Coin of the republic of Hayti.	Rev. Price Campbell of Ardersier.
43. Burgess Ticket of the Burgh of Musselburgh, with Seal appended, 1740; Original Letter of Simon Lord Fraser of Lovat, 1722; Genealogical Tree of the Family of Lovat.	John Anderson, Esq. W.S. Edinburgh.
44. Piece of Dress worn by the celebrated Lady Grange.	Mrs. Macdonald of Boisdale.
45. An ancient Roman Catholic Cross.	Mrs. Fraser, late of Kilmorack.
46. Two Basalt Columns from the Giant's Causeway.	Sir John Mortlach, Chairman of the Board of Excise.
47. Broach found in the sand hills of Coubin.	W. Falconer, Esq. Sheriff Substitute of Nairnshire.
48. Twig from the Cyprus tree growing over the grave of Marshal Ney.	John Ross, Esq. Inverness.
49. Edition of the black letter Bible called the Breeches Bible, 1610.	James Watson, Esq. Collector of Excise, Inverness.
50. Hume's History of the houses of Douglas and Angus, 1644.	A Lady.
51. Account of Lady Grange, drawn up from original MSS. and printed by Sir G. S. Mackenzie, Bart.	The Author.
52. Passport from the emperor of Germany to Alexander *Macro*, 1703.	The Rev. C. Fyvie, Inverness.
53. Pair of Horns of the North American Elk.	Mr. G. Mackenzie, yr. of Coul.

Donations.	*Names of Donors.*
54, 55. Battle Axe; Red Deer's Horns; and Snout of the Saw Fish.	A Lady.
56. No. I. of Picturesque Delineations of the Highlands, by J. G. Hamilton, Draughtsman to the Institution, with descriptions by G. Anderson, F.R.S., &c. General Secretary, published by Ackerman, London, and R. B. Lusk & Co. Inverness.	The authors and publishers.
57. Indian Creece or Dagger; Indian Purse and Coins; Pair of Java Swallows, with their edible nest.	A Lady.
58. Six copies of an etching of characters carved on a granite pillar in Aberdeenshire.	Sir Thomas Dick Lauder, Baronet.
59. Fragments of an ancient weapon found on the estate of Mr. Skeen of Hallyards, twenty feet below the surface; an old silver watch.	Lieutenant Skene, R. N. Inverness.
60. Upwards of sixty specimens of Chalcedony, Opal, Quartz, and Agate of Iceland, with the zeolites and lava of the Faroe Isles; and series of organic remains from England.	Sir George S. Mackenzie of Coul, Bart.
61. Series of Stilbite, Cubicite, Chabasite, Fluor Spar and Thomsonite of Dumbartonshire and Renfrewshire.	John Turnbull, jun. Esq. Merchant, Glasgow.
62. North American Indian War Cap and Purse.	Robert Grant, Esq. of Kincorth, Advocate.
63. Receipt for Customs, by Simon Lord Lovat to Mr. A. Fraser of Bellnain, dated in 1742.	Alexander Mackenzie, Esq. of Woodside.
64. Stone Axe from Jamaica.	Alex. Cuming, Esq. Mollochard, Strathspey.
65. Collection of Fuci and Algæ. Orkney.	Reverend C. Coulston, Stromness, Orkney.
66. Original Charter of King Robert I., No. 83, fol. 16. Reg. Mag.	George Simpson, Esq. Solicitor, Inverness.

Donations.	*Names of Donors.*
Sig.—Proclamation of Prince Charles Edward.—Ancient Silver Coins.	
67. Beautiful Stone Axe found at Castle Daviot, near Inverness.	Mr. L. MacGillivray, Huntly Place, Inverness.
68. Carved Ornamental Stone from the Priory of Beauly; Casts of the Medallions of the Titian Cæsars.	J. J. Nicol, Esq. Inverness.
69. Death's Dread Moth, (Sphinx Atropos,) found at Aldourie, Lochness.	Miss Fraser of Achnagairn.
70. Another Specimen of the same Insect found at Clacknaherry, near Inverness.	James Davidson, Esq. Civil Engineer.
71. Battle Axe, (brass) found near the Cats Cairn, between Fortrose and Cromarty.	Mr. R. Maclean, Portrait Painter.
72. Catalogue of Engravers, and Anecdotes of Painting by Horace Walpole, 4 vols. 8vo.	Mr. Hossack, Corn Extractor, Aberdeen.
73. Specimens of Serpentine and Asbestos from Portsoy.	J. Suter, jun. Esq. Inverness.
74. Three Ancient Silver Coins.	Mr. J. Cleghorn of Edinburgh, merchant.
75. Fifteen Nos. of the Scientific Gazette.	Mr. Anderson, General Secretary.
76. Bow and Arrow from Hudson's Bay.	Mr. R. Maclean, Inverness.
77. Ancient Weapon found near the Carved Pillar at Forres.	Mr. A. Cooper, jun. Castlehill.
78. Five hundred and eighty-two Ancient English and Scotch Silver Coins, principally of the Alexanders, Davids, and Roberts of Scotland, and Henrys and Edwards of England.	Duncan Davidson, Esquire, younger of Tulloch.
79. Ancient Brass Sword found under a bed of peat, in the Isle of Skye.	Alex. M'Tavish, Esq. Solicitor, Inverness.

Donations.	*Names of Donors.*
80. Two Silver Coins.	John M'Andrew, Esq. Solicitor.
81. Four Specimens of Serpentine from Portsoy.	Rev. C. Fyvie, Inverness.
82. The Book of Common Prayer in the Irish Character.	Rev. Duncan M'Kenzie, Gaelic Secretary to Institution.
83. Four varieties of Asbestos; Specimens of the Calcareous Rock of Gibraltar, with its organic remains, and of the Calcareous Stalactite of Strathaird's Cave in Skye.	James Watson, Esq. Collector of Excise, Inverness.
84. Specimens of the Lead ores and Minerals associated with them in the Lead Mines of Cumberland, and of the ore, &c. from a vein recently opened in Strath Glass, by T. A. Fraser, Esq. of Lovat.	John Fraser, Esquire, Factor for Lovat.
85. Capital of a Pilaster formerly attached to the Gateway of the Stone Bridge of Inverness.	Bailie John Ferguson, Inverness.
86. Specimen of the Black Cock.	Rev. Duncan MacKenzie.
87. Beautiful Roman Silver Coin, and Parisian Edition of Esop's Fables in 1564.	Mr. Scott, Latin Secretary to the Institution.
88. Indian War Club and Smoking Pipe.	Major W. MacKay, Hedgefield.
89. Carved Bone handle of a Knife found at Castle Spiritual, near Inverness, and curious deposit from Loch-Dochfour.	James Davidson, Esq. Civil Engineer.
90. Medallion of the Duke of Cumberland, struck after the battle of Culloden; Ancient Brass Pin from the Island of North Uist, used to fasten the Plaid.	Mrs. N. Maclean, Inverness.

Donations.	*Names of Donors.*
91. Series of Roman and British Silver and Copper Coins, and several Foreign Medallions.	John Mackintosh, Esq. Solicitor.
92. Three additional Nos. of the Scientific Gazette; A Highland Quern from Glen Roy; and Copy of Linnæus' Flora Lapponica.	Mr. Anderson, General Secretary.
93. History of the Rebellion of 1745 in verse, by D. Graham, Glasgow, 1796. Scarce.	Rev. David Ritchie, junior, Edinburgh.
94. Coins of Edward I. and Henry VIII. found in a Cave in the Island of Islay.	Lieutenant Campbell, R.N.
95. Coin of Robert II.	Henry Welsh, Esq. Fort-George.
96. Series of old Scotch Coins.	Colin Chisholm, Esq. Solicitor, Inverness.
97. Pair of Ancient Brass Compasses, and Coin of Alexander I. found in Pluscardine Abbey in 1823.	Mr. Philip Torrance, officer of Excise, Elgin.
98. Andrea Ferrara Broad Sword, and Coin of Robert I.	Mr. Alex. Watson, junior, Islandbank, Inverness.
99. An Esquimaux Canoe, 24 feet long.	Capt. Murray, R. N. Assint, Ross-shire.
100. Cast of a Gold Rod found in the vicinity of the Druidical Temple of Leys, near Inverness, in 1824.	Mr. Naughton, Curator of the Museum.
101. Specimen of precious Opal from India.	Miss MacBean, Castle Street, Inverness.
102. Silver Seal found on Culloden Muir.	Mr. Scott, Latin Secretary.
103. Several Gold, Silver, and Copper Coins.	Rev. W. Steven, Invermorison.
104. Protection to the Lands of Eskadell and Teanuilt, in 1746, and Passport from the Duke of Cumberland to Mr. W. Fraser of Aygas, 11th July, 1746.	Hugh Fraser, Esq. of Eskadale.

Donations.	*Names of Donors.*
105. Sepulchral Urn from a Cairn in the Parish of Alves.	W. Mackintosh, Esq. Millbank, Nairn.
106. Specimen of the Cass-Chrome or Crooked Spade, the Ancient Highland Plough.	Mr. Anderson, General Secretary.
107. Model of a Canadian Birch Bark Canoe.	James Wilson, Esq. Solicitor, Inverness.
108. Series of Silver Coins.	Mr. George Cobban, Inverness.
109. Beza's Geneva New Testament in French, with the Geneva Church Forms and Psalmody, 1610. (Rare.)	Rev. C. Fyvie, Inverness.
110. System of the Winds and Cycle of the Weather, by George Mackenzie, Esquire, Cyderhall, Sutherlandshire; Corresponding Member of the Institution.	The Author.
111. Six vols. of the File of the London Courier, from March 1816, to February 1821, and five vols. of the Caledonian Mercury, from March 1816, to March 1821.	Mr. Mackay, Editor of the Inverness Courier.
112. Monteith's Theatre of Mortality, or Copies of Inscriptions on the Tomb-stones, &c. in Scotland, 1704.	Mr. Smith, Bookseller, Inverness.
113. Models of West Indian household implements, manufactured cloths, and Bows and Arrows.	George Inglis, Esq. King's-mills, Inverness.
114. Beautiful Specimens of Coral and Coralline.	Mr. Wilson, Solicitor, Inverness.
115. Andrea Ferrara Broad Sword used at the Battle of Culloden, by John Bain Mackenzie, the Donor's grandfather; Sir George Mackenzie's Treatise on the Royal Line of Scotland, 1586; Memoirs of Affairs in Scotland in 1565 to 1583.	Mr. T. M. Paterson, Writer, Inverness.
116. Drawing of a Silver Bracelet	Sir Thomas Dick

Donations.	*Names of Donors.*
found at Burghead, supposed to be Roman.	Lauder, Bart. &c. &c. Relugas.
117. Experimental Researches in Chemistry; Remarks on the cultivation of the Silk Worm; Account of an improved Shower Bath; By John Murray, F.S.A. F.L.S. &c.	The Author.
118. Accounts of the Chamberlain of Scotland, in the years 1329, 1330, and 1331. Edinburgh, 1771, 4to.	Mr. Anderson, General Secretary.
119. The first three numbers of the Canadian Review.	David Chisholm, Esq. Montreal.
120. Two fine Specimens of Rock Crystal, from Goatfeld, Arran.	Rev. David Ritchie, Edinburgh.
121. Beautiful specimen of White Coral.	Mr. George Cobban, Inverness.
122. Very large Stone Axe, found at Drakies, near Inverness, and Stone Cup, or Patera, found in the same place.	Mr. James Anderson, Haugh Brea, Inverness.
123. French Rapier, found near Moyhall, in a gravel bed; and Sheath of a Sword presented by King Charles I. to Lauchlin, Laird of Mackintosh, on the occasion of his being knighted.	Lady Mackintosh, Moyhall.
124. Crown Piece of Queen Elizabeth.	Rev. Angus M'Donald, Roman Catholic Priest, Laggan.
125. American Indian Dagger.	J. A. Ore, Esq. Assistant Surgeon 95th Regiment.
126. Pane of Glass from the wreck of the Comet Steam-Boat, in the Firth of Clyde, encrusted with Shells.	Mr. S. Hunter, Merchant, Inverness.
127. Viti Beringii Florus Danicus. Olthiniæ, 1698.	D. Morison, junior, Esq. Secretary to

Donations.	*Names of Donors.*
	the Perth Literary and Antiquarian Society.
128. Large specimen of the Lamprey Eel.	Mr. T. Mackenzie, Distiller, Fort Augustus.
129. Specimen of Aberdeenshire Granite.	Right Rev. Bishop Skinner, Aberdeen.
130. Bone Comb, and Small Stone Ring, found in digging near the foundation of one of the Scandinavian Burghs in the parish of Reay, Caithness.	Mr. John Macallan, Schoolmaster, Thurso.
131. Specimens of the Dudley Trilobite and Mountain Lime Stone, Dudley, Yorkshire.	Mr. Elmsley Dallas of Invernèss, London.
132. No. I. of Lithographic Coloured Flowers, with Botanical Descriptions by a Lady.	William Mackintosh Esq. of Millbank, Nairn.
Gun Barrel, found on the field of battle on the Haughs of Cromdale.	
133. Series of Petrifications from the Coal fields of Ayrshire, and of Rocks of the primitive district of the Isle of Arran.	Rev. David Ritchie, Edinburgh, Corresponding Member of the Institution.
134. An Illuminated Missal, and Version of Thomson's Seasons in French. Paris, 1759.	Rev. W. Steven, Rotterdam, Corresponding Member of the Institution.
135. Solemn League and Covenant for the Church of Tain, signed by the Earl of Sutherland, and many others, of various dates in the end of the 16th, and beginning of the 17th century.	Donald Macleod, Esq. of Geanies, Sheriff Depute of Rossshire.
136. Geological Sketch of the North Western Extremity of Sussex, and adjoining parts of Hants and Surrey, by R. J. Murchison, Esq.	The Author.

Donations.	*Names of Donors.*
Secretary to the Geological Society of London, F.R.S. &c. &c.	
137. Specimens of Cloth woven by the South Sea Islanders, brought home by Captain Cook; Geological Specimens from Davis Straits; Do. from Labrador; Molucca Bean, thrown ashore on the Orkneys.	Rev. C. Clouston, Stromness, Orkney.
138. Series of Silver and Copper Coins, and Two Ancient Brass Pins from the Island of Harris.	J. C. Gordon, Esq. Solicitor, Inverness.
139. Carved Figure of a Bull in Freestone, from the Roman Bath at Burghead; Iron Axe, or Halbard, from the same place; Brass Axe, found on the Muir of Culloden, and Brass Pin from Cromwell's Fort, parish of Ardersier.	Sir Thomas Dick Lauder, Baronet, &c. &c.
140. Grant by Alexander of the Isles and Earl of Ross, to the Black Friars of Inverness, of an annual rent of 20s. payable out of the lands and ferry of Easter Kessock, 4th September 1437; and Notorial Copy of the Retour of an Inquest held at Tain the 20th April 1439, ascertaining the Antiquity and Privileges of that Burgh.	Alexander M'Kenzie, Esq. of Woodside, Inspector of Ancient Manuscripts for the Institution.
141. Specimen of Fossil Echinus, from Isle Oransay, Skye.	James Elder, Esq. Isle Oransay.
142. Series of Organic Remains, from the Chalk formations of England, and a Collection of Shells and Insects.	Mrs. Admiral Harvey, through Mrs. E. Fraser, Inverness.
143. Two specimens of Basalt, from the vicinity of St. Andrews, containing Crystals of Peroxyne.	Robert Trail, Esq. residing at Nairn Grove.
144. Original Letter of John Philip Kemble, Esq.	Mr. Urquhart, Bookbinder, Inverness.

Donations.	*Names of Donors.*
145. Model of an Ancient Highland Wooden Lock.	Rev. D. M'Kenzie, Gaelic Secretary to the Institution.
146. Ornaments made of the Calcareous Sinter of Gibraltar.	A Lady.
147. An Esquimaux Canoe, and North American Birch Bark Canoe, 18 and 12 feet long.	Captain Murray, R.N. Assint, Ross-shire.
148. Proof Copy on India Paper of Drawings of Elgin Cathedral, by William Clark, Esq. London, with Ground Plan, and Table of Measurements, by W. Robertson, Architect, Elgin; and an Historical Account of the Building, by Isaac Forsyth, Esq. *1826.*	Isaac Forsyth, Esq. Author and Publisher.
149. Specimen of the Lava of Mount Etna, and Series of Specimens from the Calcareous and Osseous deposits of Gibraltar; Series of Copper Greek and Roman Coins, from the Ionian Islands; Curious Paper Lantern, and Catholic Rosary.	Mr. John Fraser, Confectioner, North St. Andrew's Street, Edinburgh.
150. St. Paul's Epistles in Latin. Paris, 1553.	Mr. Scott, Latin Secretary.
151. Specimens of Shale, from Caithness, containing impressions of *Fishes.*	James Trail, Esq. Sheriff Depute of Caithness-shire.
152. Copy of the Scottish Black Acts.	Mr. Morrison, Bookseller, Inverness.
153. An Ancient Stone Reading Desk, supported on a Twisted Pillar, found in November 1826, while clearing out the foundations of St. Giles' Parish Church of Edinburgh; Two beautifully Sculptured Heads, probably Tie Stones, from the Roof of the Cathedral of Elgin; Small Square of Stained Glass, and Four	Isaac Forsyth, Esq. Elgin.

Donations.	*Names of Donors.*
Copper Coins, found in the rubbish of St. Giles's Church.	
154. Five Burmese Idols; Pair of Chinese Shoes.	The Dowager Lady Mackenzie of Coul.
155. Two East Indian Sabres, (one said to be a Damascus blade,) Indian Bows and Arrows, and Dagger; Very large specimen of Serpula Contortuplicata, from the Faroe Isles; Broach from St. Kilda.	Sir George Mackenzie of Coul, Baronet.
156. Chinese Bow and Slippers, and fine Specimen of the Globe fish.	W. Mackenzie, Esq. younger of Coul, H.E.I.C.S.

The following Gentlemen will receive Collections for this Institution, namely—Messrs. Rikards, Mackintosh and Company, and John Jameson, Esq. Muscovie Court, Trinity Square, merchants in London; Messrs. Gladstone and Grant, Liverpool; Rev. Charles Clouston, Stromness, Orkney; John Coldstream, Esq. Leith; John Turnbull, junior, Esq. merchant, Glasgow; Dr. M'Iver, Stornoway; Messrs. Campbell, Dent, and Company, Rotterdam; Lewis Gordon, Esq. merchant, and the Rev. Hugh Urquhart, Montreal; Dr. John Mackintosh, Berbice; Mr. William Fraser, watchmaker, Demerara; Messrs. Rankin and Company, Bombay; Messrs. Mackintosh and Company, Bombay; Messrs. Arbuthnot and Company, Madras; Messrs. Mackintosh and Company, and Archibald Gibson, Esq. merchants, Calcutta; James Matheson, Esq. Danish Consul, Canton; and Walter Bethune, Esq. Van Diemen's Land.

Boxes or Parcels addressed to the care of any of these Gentlemen, are requested to be distinctly marked as for the NORTHERN INSTITUTION AT INVERNESS; and those Gentlemen to whom any Packages may be sent, are entreated to advise the Secretary of their arrival, that the charges for freight, &c. may be immediately transmitted, to prevent their being in advance for the Society.

FINIS.

ERRATUM.

Page 34, line 3, *for* a Cimmerian, *read* Cimmerian.

AN

ESSAY

ON THE

LIMITS OF HUMAN KNOWLEDGE,

DESIGNED,

FROM A CONSIDERATION OF

THE POWERS OF THE UNDERSTANDING,

TO PROMOTE THEIR MOST

LEGITIMATE AND ADVANTAGEOUS EXERCISE.

BY

W. H. BATHURST, M. A.

RECTOR OF BARWICK IN ELMET; PRESIDENT OF THE LEEDS PHILOSOPHICAL AND LITERARY SOCIETY.

Γνῶθι σεαυτὸν.

Felix, qui potuit rerum cognoscere causas;
Atque metus omnes et inexorabile fatum
Subjecit pedibus, strepitumque Acherontis avari!

VIRG.

LONDON:

PRINTED FOR LONGMAN, REES, ORME, BROWN & GREEN,
PATERNOSTER-ROW;
AND ROBINSON & HERNAMAN, LEEDS.

1827.

ADVERTISEMENT.

I WILL not say that the solicitations of friends, for whose judgment I had some respect, induced me to submit the following Essay to the notice of the Public; because such a plea usually carries little weight with it, being looked upon as neither a very ingenious, nor a very successful method of obtaining the attention or approbation of readers in general. It is often discredited as an apology; always disregarded as a recommendation. I thought some little good might be done by this Publication, or I would not have committed it to the press. If it should be allowed, that there is any truth in the principles here laid down, or that there may be any benefit in their application; it seeks no higher encomium.

The principal part of this Essay was read before the Philosophical and Literary Society at Leeds, on the 15th of December, 1826. It has since been enlarged, chiefly by the addition of what relates to the nature of the Divine Being; which seemed necessary to make the subject more complete; but which would be inadmissible in a communication to a Society, which very properly excludes the discussion of matters connected with Religion. It should be clearly understood, that the Society is in no way responsible for any statements or opinions expressed in this Essay: whatever its defects or inaccuracies may be, the writer alone must bear the blame. It is not pretended, that the subject which is discussed in these pages, has been investigated in its full extent; or that all the ore has been extracted, which so rich a mine is capable of yielding: but it is hoped, that if the extent of the vein, and the value of the metal, have been exhibited; others, who possess more skill, may be induced to refine it with greater ingenuity, and apply it to the most useful purposes.

ON THE

LIMITS OF HUMAN KNOWLEDGE.

WHAT a wonderful being is man! How admirably is he adapted, both in body and mind, for the various purposes of existence! But though such is the curious and delicate organization of the body, as to afford a most unbounded scope for examination, and an ever-growing subject of wonder; yet as it is not the most distinguishing part of him, so it is by no means the most gratifying to his vanity to dwell upon the consideration of it; because the humiliating idea will be constantly recurring, that the other animals equal him in most, and surpass him in many, of his bodily excellencies.

The mind being his peculiar prerogative, and that which elevates him above the rest of this visible creation, will of course chiefly engage our attention, when we regard the wonders he has achieved, estimate the powers of which he is capable, or contemplate the high purposes for which he seems designed. And when we look to the intellectual energies of man, how much do we see to excite wonder! With what awe do we look up to those master spirits, that arise from time to

time to enlarge the boundaries of science, and give a new impulse to enquiry! How much might be said about the triumphs of human ingenuity, the depths of human erudition, the extent and variety of human knowledge! But I have no such purpose. It is not my design to expatiate on the vast progress of learning and science, but rather to show within what narrow limits this progress is confined; and that while earth seems too small for our contemplation, and we boldly advance the standards of enquiry and of demonstration, "beyond "this visible diurnal sphere," there are still a thousand objects constantly coming under our immediate notice, of which we absolutely know nothing. In examining the map of human knowledge, we soon come to degrees of latitude beyond which no navigator has been able to penetrate; we notice rivers whose sources are to this day unascertained; we see continents comprising vast tracts of unexplored country, and long lines of coast, which no one has yet attempted accurately to lay down. Barriers as insurmountable as the tropical desert, or the polar ice, oppose themselves to our progress; and after attaining to all that human skill has discovered, we find cause to confess that we are very ignorant.

Nor can it be deemed a needless enquiry, to trace how far the faculties of man are capable of advancing in the pursuit of knowledge; since it is so far from having a tendency to check the ardour of research, that it will rather assist and improve it, by showing in what direc-

tions it may be most successfully and profitably pursued. It will facilitate the conquest of the yet unknown regions of science, by marking out the most vulnerable points of attack; it will pilot the vessel in safety towards the desired haven, by showing where the rocks and shoals are situated that might impede its progress, and where the cliffs are too precipitous to effect a landing. It has been thought too, by some acknowledged judges of the human character, that learning has a tendency to foster vanity and self-conceit; and on this account, perhaps, it was that Pope declared "a little learning" to be "a dangerous thing." Should this be the case, it might have some effect in lowering the high notions we conceive of our own attainments, to consider for a moment how much there is that we do not know. It might give a stimulus to the pursuit, and a value to the acquisition of knowledge, were we to have an accurate notion of the progress we have already made; and it might sometimes save us from an unhappy exposure of ignorance, were we to consider beforehand whether we understand any thing of the subject we undertake to discuss. It may, however, create alarm in some minds to enter upon a question which can hardly fail to involve us in some degree in the appalling depths of metaphysical disquisition; and this alarm will not be unfounded, if any weight is to be attached to an opinion which I find expressed in a late number of the *Quarterly Review*, in the following terms: "Physical books

"are the most dangerous that any person can take "to perusing, except metaphysical ones; for it is "indeed a less evil to injure the constitution by "ignorant treatment, and to induce valetudinarian "feelings and habits; than to sophisticate the "understanding, and poison the mind."* Prudence would naturally deter us from attempting ourselves, and compassion from recommending to others, the study of a science which is fraught with dangers so formidable as those here mentioned. We are tempted to turn with horror from a pursuit whose tendency is so mischievous; and we cannot but regret that Locke should have perversely applied his great powers to the sophistication, not the explanation, of the understanding; and that Dugald Stewart should have unfortunately wasted so much ingenuity, not in the Philosophy, but the poisoning, of the mind. It is just possible, however, that the dangerous effects here mentioned exist only in the Reviewer's mind; an hypothesis which, for its convenience and simplicity, I am inclined to adopt; and shall not now enter into a formal defence of the science of Metaphysics; partly because it has often been better done by abler hands, and partly because the particular point, which I have undertaken to discuss, is just that which displays the weak side of Metaphysics; and may perhaps serve to show what ground its adversaries have for their too severe and sweeping condemnation. I will

* No. 68, p. 311.

merely observe, that this science, which professes to examine into the principles and causes of all things existing, appears, on the very face of it, to be engaged in matters of legitimate and interesting enquiry. And though it is indeed true, that the remote and ultimate causes of things are veiled in impenetrable obscurity, and must for ever elude our search; yet it is in many respects curious and useful to trace their more immediate and proximate causes, and examine those principles which fall within the range of our faculties. The ignorant and presuming adventurer, who pretends to have unfurled his sail upon the great deep, and professes to give a detailed account of the *terra incognita* that lies beyond the boundaries of human reason, may sometimes be the occasion of bringing up an evil report upon the science which he undertakes to illustrate: but Metaphysics will not be charged, by any candid judge, with the absurdities which originate in the reveries of the Visionary, or the foppery of the Empiric.

In considering the extent to which the human mind is capable of proceeding in the knowledge of things, it seems desirable to observe the division which is commonly made of all the objects of our perception and reasoning, into two classes, which are distinguished by the terms *matter*, and *mind*: and because of the superior dignity of Mind, as that which gives motion and activity to things in their own nature senseless and inert; it may justly claim our first attention.

There are probably many different orders of intelligent beings in the universe, and therefore minds of various capacities and powers; but the only mind whose nature we can examine, and whose powers we can duly estimate, is our own. Yet although the mind is not only always attendant upon us, but is the very essence of ourselves, the criterion of our identity; how little are we able to understand of its real nature! We are conscious of its existence and activity, and of the exercise of its various powers of sensation, memory, consciousness, reflection, reason, and will; but what it is in itself we are altogether ignorant. We may call it an immaterial, intelligent substance; but these are words to which no idea can be attached; they express something of which we can form no conception. They are merely a confession of ignorance, though they may often have the effect of concealing that ignorance from us; because we are apt to suppose, that every word, or set of words, which we use, must represent some ideas that exist in the mind. But this is by no means the case. Words are often used as the substitutes, as well as the representatives, of ideas. Whence it happens, that many disputes arise about words, when there is no contrariety in the opinions of the disputants. For we find it so convenient to make use of words in thinking, as well as in conversation, that we are often induced to avoid the trouble of weighing well the notions which are attached to them. To say that mind is *immaterial*, is only

saying what it is not; to call it *intelligent*, is merely to describe its faculties or powers; to speak of it as a *substance*, if it express any thing, can mean no more than that it has an existence: so that these words are very far from explaining what a mind really is. All knowledge is conveyed to us by the medium of the senses, and by reflection operating upon the sensations so produced; but mind does not act upon any of the senses. We cannot see or hear, smell, taste, or touch it; and therefore, although reflection may assure us of its existence, reflection cannot impress upon us any perception of it, or make us at all capable of apprehending its nature.

And if we find it difficult to answer the question, What is mind? we are no less at a loss to ascertain the manner in which information is conveyed to it, and in which it operates upon the information it acquires. There is no doubt that we become acquainted with external things solely by means of our five senses; but we are wholly unable to explain the manner in which they produce this effect. That matter should by any means have the power of exciting ideas in a mind, is very unaccountable; nor does it bring us much nearer to a solution of the difficulty, to know that the communication between them is effected by the intervention of material organs. We find by experience, that as we are at present constituted, the organs of sense are necessary for the reception of ideas; but whether the mind can

receive no ideas but in connexion with the body, or whether on the other hand the body is its prison, by which its energies are repressed, and its sphere of comprehension confined, we have not sufficient data to determine. So much is certain, that our minds receive all the information they are now possessed of, from the intercourse which they maintain with external things; but still it is impossible that those outward things should be the immediate objects of perception. We talk of seeing a house, a mountain, or a river; and the expression may be very allowable, as suited to popular use; but the thing which in these cases the mind actually perceives, is not a distant object, but an idea of its own. It cannot go forth and put itself successively in contact with outward things at different distances, nor can those outward inert substances put themselves in action, and strike upon the mind within us. The mind therefore surveys nothing but its own ideas. But how are these ideas produced? The common account of the method by which it is done, is this. In the first place, the organ of sense is acted upon by some object, either immediately, as in the case of touch; or by the intervention of some medium, when the object is at a distance, such as rays of light in the case of vision, and undulations of the air in hearing. Then the nerves which pass from the brain to the organ, receive and convey these impressions to the brain; and lastly, the impression thus made upon the organs, nerves, and brain,

rouses the attention of the mind, and causes a sensation. But this description, which is the best that we can give, is very unintelligible. Taking the organ of sight for instance, we can easily conceive how any outward object may be reflected, or form an image, upon the retina: but here our ideas stop short, although we attempt to carry the description farther. How the impression is conveyed to the nerve, how it is transmitted through that to the brain, and when it gets there, how it produces an idea in the mind, we are totally unable to imagine. The mysterious connexion between mind and body baffles all investigation; and we must be content to be ignorant how matter can produce sensation, either with or without the organs of sense. But after all, what is it we perceive when we open our eyes? Not matter: for no one pretends that a material image is either painted on the retina, or impressed upon the mind. Not figure, magnitude, or distance: for no one, by simply looking at the moon, acquires the ideas that its form is spherical, its diameter 2180 miles, its distance from the earth 240,000; and so of other objects in proportion. The only idea immediately conveyed to us by the eye is colour; and the different colours which strike the sight would present to us nothing but perplexity and confusion, did we not learn by experience to associate the ideas of particular substances and forms with particular colours, and so gather a meaning from them, which by themselves they would never convey.

This may be illustrated by comparing the colours of all substances with the written characters of a language. When we look for the first time into a Persian or Chinese book, we see nothing but a confused assemblage of lines and marks. But if we learn the language, though the eye still sees nothing but the same marks, yet ideas are now attached to them, which a simple view of the marks will always excite in the mind. In the same way the colours of things form an universal language, written by the great Creator for our instruction; but which, like other languages, must be learnt, before it can be serviceable in presenting us with ideas. An infant, or a blind man suddenly restored to sight, is just in the situation of one to whom a book in an unknown tongue should be laid open. Nothing appears to them but a confused mixture of colours; until by degrees, through the assistance of the touch, and other senses, the several colours become associated with other properties of sensible objects; so that in time, by simply looking at any thing, we have an idea presented to us of its substance, figure, use; often of its distance, its origin, and several other qualities or accidents that belong to it. But our acquaintance with external things advances so imperceptibly from our earliest years, that we cannot remember the time when the sensations with which any substance affected us through the medium of sight, were not intimately and indissolubly associated with those which reached us

through the other senses. It was however to be expected, that in the case of distant and inaccessible objects, the ideas which the sight conveys to us should for a longer time remain simple and unmixed; and hence it comes to pass, that children who have learned to avoid taking up an ignited coal, notwithstanding its attractive colour, will yet continue to cry for the moon, and to wish to have a few of the stars to play with. But though we are able, in some degree, to ascertain what are the impressions which each of our senses conveys to us, and how these conspire together to make us acquainted with the external world; we cannot discover by what means any of them produces that effect which is called sensation. If we examine the Ear, we find a series of little bones behind the membrane of the tympanum, which we cannot doubt are instrumental in conveying sounds towards the brain; we find them communicate with an aqueous fluid in the labyrinth, where the auditory nerve is situated; but we must shrink in despair from the task, when called upon to explain how these bones can produce or transmit every variety of tone, with more accuracy than any musical instrument; or how, by any combination of vibration or impulse transmitted by them to the nerve, the mind can acquire the idea of sound. A similar veil of impenetrable mystery hangs over the operations of the other senses. There is the apparatus all complete; it is almost incessantly in exercise during our

waking hours; but how it acts, no human ingenuity or research will probably ever be able to discover.

And if we are ignorant by what means any sensation is produced in the mind, we are no less in the dark as to the manner in which it retains or recals ideas, and operates upon them. The sensations that have once been produced in the mind are sometimes obliterated, or nearly so, almost as soon as the exciting cause is removed; but at other times the impression lasts for a very long period; or rather, there is a power in the mind, by which it can recal past impressions, and meditate on them, for we cannot conceive an idea to be existing any where, when it is not perceived. But this faculty of memory is very inexplicable. We may compare it to the turning over a collection of pictures, or consulting a memorandum book; but we cannot suppose that this comparison gives any real explanation of the process. Dr. Reid, in his Essays on the intellectual powers of man, says, "The know-"ledge which I have of things past by my memory, "seems to me as unaccountable as an immediate "knowledge would be of things to come; and I "can give no reason why I should have the one "and not the other, but that such is the will of my "Maker. I find in my mind a distinct conception, "and a firm belief, of a series of past events; but "how this is produced I know not. I call it "*memory;* but this is only giving a name to it; it "is not an account of its cause."

But as the same writer observes soon after, "Our original faculties are all unaccountable." When we exercise Consciousness, Reflection, Deliberation, Judgment, and Will, we cannot at all explain the operations, though we feel sensible of a difference in the process and result, which makes us give them different names. To some it has appeared so strange, that these different faculties should reside in the same mind, that they have rather chosen to suppose that there are several minds, or that the mind consists of separate parts; a notion which Aristotle seems to have entertained; but which removes no difficulties, and introduces a needless multiplication of causes. When we have deliberated and determined with ourselves on the propriety of any action; it is commonly said, that the Will issues its orders to the several parts of the body to put it in practice. This sounds very well, but what does it mean? We can no more conceive how the mind can act upon the body, and occasion the motion of the several limbs, than how it can itself be acted upon by matter from without. The nerves are here again called in to our assistance, but can only shift the difficulty, or alter its aspect, without removing it. Nor can we any more explain how the Will acts upon the mind itself, in producing or regulating its other operations. Sometimes they are most submissive under its controul; at other times they rise in open rebellion, and throw off its yoke. Memory, for instance, is a very self-willed and contumacious

subject. An event or scene which is familiar to us, we can readily recal when we please; but where the impression is more faint, it often will not attend at our summons, when we most want it, but will impertinently force itself upon our notice, when we would rather think of something else; and all the efforts of the Will have been found unavailing, to erase an unpleasant impression from the Memory. Indeed the more the attempt is made, the more force does the impression acquire; so that the Will being destitute of all means of exerting its authority, is obliged to sit down quietly with the affront, and connive at a grievance which it cannot redress. But the Will thus foiled in its attempts to maintain an acknowledged authority over Reflection and Memory, takes its revenge, by refusing, in its turn, to yield implicit submission to the Judgment, which claims the right of directing it: and to such an extent does it carry its undutiful resistance, that the Judgment has been known to confess, that it cannot always compete with the Passions in holding supremacy over this wayward faculty. And even Deliberation and Judgment themselves, though professing the most disinterested integrity, and constantly asserting that they recognise no master but Reason, will sometimes allow themselves to be biassed by Inclination; which has such a dexterous and skilful way of managing the business, that it will obtain from them a verdict in its favour, without even allowing them to suspect that they have

received a bribe. It was probably this seeming contrariety and opposition among the several faculties of the mind, that caused some of the ancients to suppose that it was itself composed of distinct parts; but in fact we do not know what is meant by parts of a mind; the nature of mind, the manner of its subsistence, and the possibility of its division, being alike concealed from us. Still our ignorance in this respect does not at all prevent us from exercising our faculties with advantage and success, in the several ways which the Author of Nature has laid open to us. We may explore the depths of Science, traverse the realms of Knowledge, and advance the comfort and happiness of our fellow creatures; but we must confess that our powers are limited, when we perceive, that the manner in which one faculty is exercised, or one piece of information laid up, is inexplicable.

We are scarcely accustomed to consider the inferior animals as possessed of minds; but perhaps in this respect we treat them with undeserved contempt. With all our pride we must acknowledge, that in some cases their powers of mind come so near to ours, that we must find ourselves much puzzled to determine where is the exact line which separates Instinct from Reason. We are apt to give the name of *brutality* to such conduct as exceeds the ordinary degrees of human depravity; but we thus cast a most undeserved stigma upon the race of brutes; for if, in some instances, their actions be similar to those which in man

would be indicative of the worst passions, in others they set us examples of virtue which we might imitate with great advantage. The Egyptians certainly carried matters to a strange length, when they paid divine honours to various animals; and the opinion mentioned by Virgil, which ascribed to bees a portion of divine intelligence, may justly be thought rather extravagant. Nor is the doctrine of Pythagoras free from absurdity, who taught that the human soul, in the course of its transmigration, took up its residence in the bodies of brutes. But while we assign to the irrational animals their due subordination, we may observe much in them that is curious and instructive. That they have minds, which more or less resemble our own, appears indisputable. They exhibit many of the same passions, as love, hatred, courage, emulation, revenge; many of the same faculties and habits, as memory, perseverance, cunning, forethought, fidelity, social union for mutual assistance and defence, and in many instances the most astonishing mechanical skill. No human ingenuity could surpass that of the beaver in the construction of its habitation; or that of the bee in the formation of its cell. No human sagacity can equal that of the horse or dog in retracing their steps homeward from any distance; or that of the spider in prognosticating changes of weather. It cannot, perhaps, be safely affirmed, that the art of sailing was first learnt from the nautilus, or of sewing from the tailor-bird; but it is pretty certain

that the tunnel would not now be forming under the Thames, upon the present ingenious and scientific plan, had not the idea of it been suggested to Mr. Brunel, by his observation of the manner in which the Teredo eats its way into the hardest wood.* There is this peculiarity in the mind of inferior animals, that it is capable of no improvement. Man comes into the world weak and ignorant, but advances in knowledge from year to year, while his species is making such a progress, that each generation knows more than that which preceded it. Other animals appear to possess all the skill or sagacity they exhibit, from their birth; without any instruction they will follow the plans, and walk in the steps, of their progenitors; but no advance is made, and they continue to be just such as they were at the creation of the world. But though the difference between the mind of man and that of inferior animals appears in general sufficiently marked, yet some cases occur which make it difficult to say where instinct terminates, and reason begins.

What then is instinct? Shall we with Cudworth refer this faculty to a certain plastic nature? or with Buffon, (in the case of societies of insects), to the circumstance of a great number of individuals being brought into existence at the same time, all acting with equal force, and obliged by the similarity of their internal and external structure, and the conformity of their movements,

* Edinburgh Philosophical Journal, No. 20, p. 276.

to perform each the same actions, in the same place, in the most convenient mode for themselves, and least inconvenient for their companions; whence results a regular, well-proportioned, and symmetrical structure? Shall we maintain with Addison, that instinct is an immediate and constant impulse of the Deity; or with Darwin, that "it is identical with reason; or with Lamarck, that it is a certain inclination arising from habits impressed upon the organs of animals, by the constant efflux towards these organs of the nervous fluid, which during a series of ages has been displaced in their endeavours to perform certain actions which their necessities have given birth to?" It is quite evident from these conflicting statements, and especially from the last, that we are getting beyond the limits of our knowledge; and therefore it may be as well to stop here, and confess that we know nothing about the matter.

If we attempt to raise our thoughts towards the Supreme Being, the most perfect of all intelligences, and the source of existence to all others; how little are we able to form any notion of his essence, or even to comprehend many of his attributes! We say that he is an eternal, unchangeable, omnipresent Spirit, uniting in himself the utmost perfection of power, knowledge, and virtue. But what idea have we of that attribute of *eternity?* We explain it to mean, that which has neither beginning nor end; but have no more conception of the thing than we had

before. To conceive time without a beginning, or a spirit that has existed in all that time, is, I think, beyond the power of our faculties. Nor is it less difficult, though at first it may appear so, to form a notion of that which shall have no end. All the ideas we receive by the senses, are of things finite, and capable of increase or diminution. The mention of infinity, therefore, confounds all our apprehensions; as it implies a whole made up of no assignable number of parts, to which no addition can be made, and which will remain of just the same magnitude after millions of years have passed away. But not only is eternity beyond the grasp of our minds; we also find it impossible to give an exact definition of what is meant by *time*. The constant succession of ideas in the mind appears to be that which impresses us with the notion of time. If any one could stop this succession, or be wholly without ideas, to that man there could be no such notion. We can have no reason to suppose that time is an absolute, self-existing thing; but rather the relation which the train of our thoughts bears to things permanent and stationary. As it is probable, and indeed as certain as the nature of the case will admit, that there is no such succession of ideas in the mind of the Deity, as we experience; but that things past, present, and future, have an immutable co-existence there: it will follow that time, as we use the word, has no meaning as connected with the Eternal; and that it is per-

fectly true, although we cannot apprehend the full import of the words, that "one day is with "him as a thousand years, and a thousand years "as one day." But we believe God to be unconfined in space, as well as unlimited in duration; and this also is an attribute of which we can form no distinct idea. We can easily talk of boundless space, but we cannot, I think, form any actual conception of it; still less can we conceive a Being who pervades all that space. We are so ignorant of the nature of the Deity, and of the relation which he bears to matter; or to space, that is, absence of matter, that we cannot form any notion of what is meant by his being every where present; though we can easily receive this truth in its practical application, and be fully persuaded that he has an absolute controul over events in every part of the universe, and is perfectly acquainted with the actions, words, and thoughts, of every intelligent creature. The Supreme Being is supposed moreover to be of infinite power, knowledge and virtue. The only way we have of conceiving these attributes, is by thinking of the highest degree of power, knowledge, and virtue, possessed by men, and then supposing them increased to an indefinite extent in the Deity. But we are thus furnished with a very inadequate, and probably a very erroneous, view of the divine perfections. Infinite power and benevolence in the Supreme Disposer of events would appear, according to our confined notions, inconsistent with the existence of evil; his perfect fore-know-

ledge with man's freedom of will; his attributes of infinite justice and infinite mercy would seem incompatible; but it would argue a strange ignorance of ourselves, were we to conclude, that the difficulties which on these subjects suggest themselves to us, have any existence beyond what they owe to our imperfect apprehensions. Having no standard by which to measure the qualities and dealings of an infinite Being, but that of our own finite reason; it would better become us, to acknowledge our total incompetency to such a task, than betray our arrogance and folly by attempting to estimate the motives, or arraign the conduct, of Him, "who only hath immortality, "dwelling in the light which no man can approach "unto; whom no man hath seen, nor can see." If it be true, that "his thoughts are not as our "thoughts, nor his ways as our ways," it naturally follows, that "there is no searching of his under-"standing," that "we cannot find out the "Almighty unto perfection," that "his judg-"ments are unsearchable, and his ways past finding "out." If "all things are possible with God;" if "all his works are known unto him from the "beginning of the world;" if he alone is wise, "his work perfect, and all his ways judgment;" "Who" then "hath known," or can know, "the "mind of the Lord?" "Who will say unto him, "what doest thou?"

Our knowledge of the attributes of God being thus confused and imperfect, what idea can we

form of his essence? This is yet one step farther beyond the limits of our knowledge; and therefore, although a faint and shadowy outline of the attributes of the Deity may reach our perception, of his nature we can know nothing. Here we launch upon an ocean without a compass or a chart to direct our course. The question having been put to Simonides by Hiero, What is God? he desired to have three days to consider; on their expiration, he desired three days more. We must acknowledge, with the heathen Philosopher, that this is a subject, on which the more we reflect, the more we are bewildered; and we may as well desist from an attempt, which can have no other result than that of showing the confined range of our faculties. But if the essential nature of that Spirit, to whom belong the perfections of divinity, be thus completely out of the reach of our natural apprehension; it might be expected that if he were pleased to give us any information respecting this mysterious nature, language could not be found that would convey to us a complete understanding of it. There is no other way by which we can gain any acquaintance with things that lie beyond the reach of our faculties, but through the enlargement of those faculties; and if we find ourselves opposed by insuperable difficulties in investigating our own nature, so that all which lies beyond a certain point is not only uncomprehended, but incomprehensible; how much more must it be supposed, that the nature of that God, who inhabiteth

eternity, is at once indiscernible by any human sagacity, and incapable of being intelligibly described in any human language. Following the plain interpretation of the word of God, we feel ourselves compelled to receive the doctrine of the Trinity; but at the same time, considering the truth which it involves to lie beyond the boundary of our natural attainments, we do not attempt to explain it. It is the same with all other subjects of pure revelation. We may admit their truth, admire their fitness, and experience their utility; without pretending to lay open to the full inspection of the human understanding, that which, in its very nature, is situated beyond its reach. The atonement of the Son of God, the sanctifying influence of the Holy Spirit, are truths which supply the richest consolation to the believer's soul; though the mode of their operation falls not within the sphere of his intellect. But limited as are the faculties of man even in explaining the things which more immediately come under his notice; there is yet a pride in our nature which makes us unwilling to yield a cordial assent to the unexplained mysteries of God. Notwithstanding the confessed inadequacy of our reason to apprehend the counsels and operations of the Almighty, we are still apt to demand, with all the self-sufficiency of presumptuous ignorance, "How can these things be?" In this, as in many other cases, we too often miss the substance, while we grasp at the shadow. "Know thyself," is a precept, which, if requiring

the wisdom of a Thales to propound to the world, calls for no less a measure of understanding to reduce to practice. If we knew with somewhat more accuracy than is commonly done, the extent of our own faculties; we might be more ready to give up the unprofitable speculations of mere curiosity, for the better object of deducing beneficial and practical results from acknowledged principles. We may be assured, that our knowledge is exactly proportioned to our wants, and designed to be conducive to our happiness; and we do but pervert the end for which divine revelation has been given to us, if we would know all the reasons and modes of God's government, before we will allow his word to have that practical operation upon our hearts, which is the sole purpose of its delivery. Let us be content to "know in part," and to profit by the light that is given us; and all may be well: let us assert the supremacy of human reason, and doubt of every thing which comes not within its reach; and we may live in disquietude, and die in despair. It is no less just than natural, that while the alchemist starves in his search after the Philosopher's stone; the active mechanic thrives and grows rich: and that, in like manner, while the sceptic finds the light and efficacy of divine truth intercepted by difficulties of his own creation; the humble Christian believes and is happy.

But it is time to come to the second division of my subject, which regards the knowledge that

we have of *matter*. And here a considerable difficulty besets us at the very outset. For as some persons maintain, that there is no proof of the existence of an immaterial, thinking substance within us, and even Locke says, that "possibly we "shall never be able to know whether any mere "material being thinks or nb;" so there are others who contend, that matter itself cannot be proved to exist; at least, as a separate substance, independent of any mind. This at first seems a very strange position; but it is supported by such strong arguments, that it is much more easy to laugh at, than confute it. It may be as well to give an outline of Bishop Berkeley's mode of supporting this hypothesis; because, if we are to believe him, all the difficulties that seem to stand in the way of our complete knowledge of things, are merely imaginary; every object of sense being just what it appears, and nothing more. He sets out with proving, that there are no such things as abstract ideas; that a general term, such as the word *Colour*, does not express a corresponding general idea; for if we think of colour at all, it must be of some particular colour; as we cannot, by any effort, form an idea of colour in general, which is neither red, blue, green, nor any of the rest. Applying this to the subject before him, he maintains, that it is equally impossible to form an idea of the independent existence of any thing, as distinguished from its being perceived. He says: "That neither our thoughts, nor passions, nor

"ideas, formed by the imagination, exist without "the mind, is what every body will allow. And "it seems no less evident, that the various sensa- "tions or ideas imprinted on the sense, however "blended or combined together, cannot exist "otherwise than in a mind perceiving them. I "think an intuitive knowledge may be obtained of "this, by any one that shall attend to what is "meant by the term *exist*, when applied to sensible "things. The table I write on, I say, exists; "that is, I see and feel it; and if it were out of "my study, I should say it existed, meaning "thereby, that if I was in my study, I might per- "ceive it, or that some other spirit actually does "perceive it. There was an odour, that is, it was "smelled; there was a sound, that is to say, it "was heard; a colour or figure, and it was per- "ceived by sight or touch. This is all that I can "understand by these and the like expressions. "For as to what is said of the absolute existence "of unthinking things without any relation to "their being perceived, that seems perfectly unin- "telligible. Their *esse* is *percipi*, nor is it possible "they should have any existence, out of the minds "or thinking things which perceive them."— To show how he further confirms this position, and refutes the objections brought against it, would be to transcribe his whole work. Those who contend for the existence of matter, are apt to make a distinction between *primary* and *secondary* qualities of bodies; signifying by the former, those which

actually exist in the substances we perceive, as *extension, figure,* and *solidity*—by the latter, those which they acknowledge to exist only in the mind; as *colours, sounds, tastes,* and sensations of *touch;* as *heat* and *cold.* Berkeley maintains that there is no ground for this distinction, since the qualities of the first class exist simply in the mind, just as much as those of the second. If it might be allowable to question the accuracy of the reasoning, or breathe a suspicion upon the necessity of the conclusions, drawn by so very acute and sensible a writer; I would venture, with all due deference, to make a few observations upon this theory.

It is allowed that ideas exist only in the mind; and that it would be possible for an Omnipotent Being to impress upon us ideas similar to those we now have, without the intervention of any material substance. But it would be very singular that so universal a mistake should have been made, in a case of constant and habitual occurrence, as that which supposes the archetypes of our ideas to be something external; for I suppose there is scarcely a person who is not surprised, when he first hears it maintained that matter does not exist, and who does not feel an extreme repugnance to such a proposition. And although we cannot indeed perceive with the mind external objects; yet it seems to be so natural a conclusion from what we do perceive, that there are such objects; that it must have been designed by our Maker that we should draw this conclusion.

That the sensations of colour, sound, or taste, do not exist in a senseless mass of matter, is very certain; but they appear to be indications to us of some qualities in matter which are the cause of such sensations. Our knowledge of the primary qualities, however, of solidity, extension, and figure, seems to be gained by inference and reflection, rather than from those qualities being merely ideas in the mind. From finding a resistance opposed to our efforts, when we endeavour to compress any substance, we infer that it possesses solidity. In other cases, reflection leads us to this conclusion, when there is no corresponding impression made upon the senses; and therefore no idea, properly speaking, produced. Thus, air possesses solidity, or the property of excluding other things from the space which it occupies, as much as iron; though it is not so readily inferred in the former, as in the latter instance. We are led to conclude also with the utmost certainty, that air, or the earth's atmosphere, has extension and figure, though no one ever saw them; but a man would never suppose it to have colour or taste, unless he actually perceived them. Berkeley says, "They "who assert that figure, motion, and the rest of "the primary original qualities, do exist without "the mind in unthinking substances, do at the "same time acknowledge that colours, sounds, "heat, cold, and such like secondary qualities, do "not; which they tell us are sensations existing "in the mind alone, that depend on, and are occa-

" sioned by, the different size, texture, and motion,
" of the minute particles of matter.—Now, if it be
" certain that those original qualities are inseparably
" united with the other sensible qualities, and not,
" even in thought, capable of being abstracted
" from them, it plainly follows that they exist only
" in the mind. But I desire any one to reflect
" and try whether he can, by any abstraction of
" thought, conceive the extension and motion of a
" body, without all other sensible qualities."
Now it seems to me very possible to abstract the secondary qualities from the primary, not in thought only, but in reality. There are so many substances that are destitute of taste and smell, that we can certainly conceive extension divested of them. And by simply carrying any thing into a dark room, we deprive it of its colour, though its figure, extension, and solidity, remain. When we consume oil in a lamp, we convert a substance of a certain colour, smell, and taste, into a vapour possessing none of those qualities; but we cannot take from it its solidity, extension, or figure. These we cannot even in thought separate from the finest and most aeriform substance, though it be not perceivable by any of the senses; from whence I would draw the conclusion, that those qualities are not ideas, or sensations; but properties, which reflection and experience lead us to attribute to matter. I think that we discern matter and its primary and inseparable qualities, much in the same way as we discern the meaning

of words, by looking at the written characters; or as we perceive the working of some passion in the breast of another, by observing the expression of his countenance. When we find that it is necessary to stretch out the arm at full length, before we meet with any resistance from an object that we see; when we find that we have to walk several yards, or several miles, before we come in contact with others; the inference is irresistibly forced upon us, that there are substances separate from ourselves. Or when we are so unfortunate as to have our head broken with a cudgel, we feel ourselves very strikingly impressed with a persuasion that there are external things; though we should perhaps be as little justified, in saying that we see or feel the material instrument which causes pain, as in asserting that we see anger or fear in a man's countenance. It is granted that matter is not immediately an object of sense; but we are so habitually and necessarily led to infer its existence, that, though sometimes erróneously induced to think that it is itself perceived, we cannot willingly admit that it is wholly a delusion.

But if there be such a thing as matter, what is the nature of it? To this question we do not pretend to give a direct answer; we can only form an obscure and relative notion of what matter actually is. Thus Locke says: "If any one will "examine himself concerning his notion of pure "substance in general, he will find he has no other "idea of it at all, but only a supposition of he

"knows not what support of such qualities, which "are capable of producing simple ideas in us;" and the reason for supposing this thing to exist which we cannot explain, he gives thus: "Because "we cannot conceive how the simple ideas of "sensible qualities should subsist alone, nor one "in another, we suppose them existing in, and "supported by, some common subject; which "support we denote by the name *substance*, though "it be certain we have no clear or definite "idea of that thing we suppose a support."* Our notion of material substance being thus indistinct, it seems to follow, 1st, That we cannot be absolutely certain that it exists; and 2dly, That all our real knowledge must be founded upon those sensible qualities of matter, of which we have definite ideas; and not upon matter itself, of which we know nothing. I proceed therefore to consider, what are the limits by which this knowledge is confined, and where the barriers are fixed which oppose the progress of human enquiry.

Since all knowledge is founded upon the ideas that we receive through the medium of the senses, it is plain that our knowledge cannot extend farther than our ideas; and though, by means of the five senses, a vast field of information is laid open to us; yet on account of their limited number, as well as their defective acuteness, it is probable

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* Book 2, chap. 23, sect. 2.

that the utmost extent of our knowledge embraces but a small portion of all that might be known in the universe; and that "there are more things in "heaven and earth, than are dreamt of in our "Philosophy." We are wholly unable to estimate the degree in which the first of these causes, the paucity of our inlets of perception, operates in excluding us from the knowledge of external things; since there is no way of knowing our want, but by having it supplied. But we are rather more capable of forming a notion of what we lose by the imperfection of our organs of sense; since these are found more acute in some persons than others, and artificial means have been discovered of increasing their power. There is a Paper by Dr. Wollaston in the Philosophical Transactions for 1820, "on sounds inaudible by certain ears;" in which he says, that he has ascertained by experiment, that there is a limit to our hearing of very acute sounds, which is different to different people; but which in all probability lies far below the sharpest notes that can be produced. He concludes thus: "The range of human hearing "comprised between the lowest notes of the organ, "and the highest known cry of insects, includes "more than nine octaves, the whole of which are "distinctly perceptible by most ears, although the "vibrations of a note at the higher extreme are "six or seven hundred-fold more frequent than "those which constitute the gravest audible sound. "Since there is nothing in the constitution of the

"atmosphere to prevent the existence of vibrations "incomparably more frequent than any of which "we are conscious, we may imagine that animals "like the grylli, whose powers appear to commence "nearly where ours terminate, may have the faculty "of hearing still sharper sounds, which at present "we do not know to exist; and that there may "be other insects hearing nothing in common "with us, but endued with a power of exciting, "and a sense that perceives vibrations, of the same "nature indeed as those which constitute our "ordinary sounds, but so remote, that the animals "who perceive them may be said to possess another "sense, agreeing with our own solely in the medium "by which it is excited; and possibly wholly "unaffected by those slower vibrations of which "we are sensible." There can be little doubt, that a limit of perception, similar to that here ascribed to the ear, belongs also to the eye; and that, although perfectly suited to the purposes for which it is required, it will not furnish us with that intimate acquaintance with the visible qualities of things, which a differently constituted organ might do. The use of magnifying glasses gives us a much clearer insight into the nature and composition of many substances, of which before we knew but little; and brings us acquainted with the existence of many things, of which previously we could have had no conception. But as there is not the slightest reason to think, that by these

artificial means the power of vision has been carried nearly to its utmost extent; it is most probable, that as there are numberless worlds so far removed from our sight, that we can know nothing of what is going on in them; so there may be much delicate organization of matter, and myriads of animated beings, immediately about us, which are too minute for the keenest eye-sight to discover. The extraordinary acuteness which is occasionally found in some of the senses, particularly where others are defective, may also serve to show, that in their ordinary state, none of them possess all the power of which they are susceptible; and therefore do not admit us to a full acquaintance with the objects which they severally embrace. The sense of Touch is sometimes possessed of such astonishing power in persons born blind, that those cases, in which Naturalists have thought they had discovered traces of a sixth sense in some animals, may perhaps be sufficiently accounted for, by supposing this faculty to exist in a very acute degree. But all this seems to show that our powers of sensation are very limited; and therefore that our knowledge must be proportionately confined: and there is probably many a mean insect that we heedlessly trample under foot, which has senses so much more acute than our own, that if it could but communicate its sensations to us, it might bring us acquainted with unthought of wonders in nature, and lay the foundation for new speculations in Philosophy.

It is perhaps partly owing to this imperfection of our senses, and the consequently confined range of our ideas, that we are so wholly unable to determine the causes of any of the phenomena which we behold. In the investigation of nature, we commonly pursue the analytical method, tracing the effects which we see, to their causes; but in this process, we always arrive at the limit of our faculties, before we can obtain complete satisfaction; we find ourselves stopped by something which we cannot comprehend: and though the acuteness and research of some highly gifted men have brought to light causes and principles before unknown; yet all that they have effected, is to remove a little farther off the boundaries of our knowledge; but in no instance to break them down altogether, or give a complete explanation of one production or operation of Nature.

It was a very great step which Newton made in the science of Astronomy, to point out one general law, by which all bodies that come within our notice are governed—that of gravity or attraction. By this we can now account for the regular motion of the heavenly bodies, as well as for every deviation from regularity; of which, before his time, Astronomers could give no satisfactory and consistent account. To link together separate and apparently very dissimilar facts, by ascribing them to one common cause, was an attempt worthy of the profound sagacity of that great man; but even he could not overstep the limits assigned to our

knowledge. He has carried us to *attraction*, and there he stops: there probably, is the boundary, beyond which we cannot, with our present faculties, advance a step. Neither Newton, nor any one else, has ever explained what this attraction is. He says himself; "I use the word *attraction* in "general for any endeavour whatever of bodies to "approach to each other; whether that endeavour "is made by the action of bodies either tending to "each other mutually, or agitating each other by "spirits emitted; or whether it arises from the "action of ether, or air, or any medium, whether "corporeal or incorporeal, any how impelling to "each other bodies enclosed therein."*

Attraction is, in fact, a word used to express a certain effect generally observed in nature, of the cause of which we are totally ignorant. A commentator on Newton observes; "It is clearly "proved by experiment and demonstration, that "the planets describe elliptical orbits; and that "the forces which draw them out of a rectilinear "course, so as to make them describe these orbits, "are directed to their central bodies, and vary "inversely as the squares of their distances. But "neither mathematical demonstration, nor experi-"ment, will help us to discover what these centri-"petal forces really are."† Bishop Berkeley says

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* Scholium to Prop. 69, book 1.

† Newton on Newton, p. 56.

upon this subject; "The great mechanical principle "now in vogue, is *attraction.* That a stone falls "to the earth, or the sea swells towards the moon, "may to some appear sufficiently explained thereby. "But how are we enlightened by being told this "is done by attraction? Is it that that word "signifies the manner of the tendency, and that "it is by the mutual drawing of bodies, instead "of their being impelled or protruded towards "each other? But nothing is determined of the "manner or action, and it may as truly (for ought "we know) be termed *impulse* or *protrusion,* as "*attraction.*" There have been attempts made by different persons, to explain what is meant by attraction, but without much success; and the necessary inference seems to be, that here we have arrived at the utmost limit to which our faculties can reach. In this, as in many other cases, we must agree with the observation of Dr. Reid, that "In the operations of "mind, as well as in those of bodies, we must "often be satisfied with knowing that certain "things are connected, and invariably follow one "another, without being able to discover the "chain that goes between them. It is to such "connections that we give the name of *laws of* "*nature;* and when we say that one thing produces "another, by a law of nature; this signifies no "more than that one thing, which we call in "popular language the *cause,* is constantly and "invariably followed by another, which we call the

"*effect*, and that we know not how they are "connected."

If we descend from the heavens, to contemplate things more immediately about us, we may see much to excite our admiration, in the animated beings that people this earth, and much also to check our presumption. A minute examination of our own bodily frame, exhibits many beautiful contrivances, many curious operations, and many insuperable difficulties. We can ascertain the use of many of our internal, as well as external organs, and can form some notion of the functions they are destined to perform. But if we go on to enquire, how they operate in executing their several offices; we find ourselves just upon the utmost limit to which human skill can reach. There are few of our organs, that have a more important office to execute than the stomach; so at least we may naturally infer, from the large share which it occupies of our thoughts, and the great pains that we take to keep it in good humour: but how little can we explain the manner, in which it performs its peculiar function of digesting food! The gastric juice is known to be the chief agent in this operation; but yet we cannot account for it upon mere chemical principles; but are obliged to call in to our aid the vital energy, which is always the last resort in physiological difficulties, and is equivalent to a confession of our utter ignorance. No less difficult do we find it, to explain how the nutritious matter is taken up by the lacteals, and

conveyed into the blood; or how from thence it becomes assimilated with the substance of the body, and supplies its continual waste. Until the lymphatic system, and the circulation of the blood, were discovered; the limits within which all knowledge of the animal economy was confined, must have been very narrow: but although they have since been extended, and may admit of farther enlargement; yet without doubt there is a boundary in this branch of enquiry, beyond which we can never go; and which probably lies at that point, where the principle of life influences and directs organic action. The manner in which the blood undergoes that change in the lungs, which fits it for performing its peculiar office, has never been completely explained; and though the change seems to be merely of a chemical nature, yet that strange vital principle may be so far concerned, as to throw its mysterious veil over this operation also, and effectually prevent its complete elucidation. We find it necessary to call in the same agent, in order to account for the keeping up of animal heat at a uniform temperature, and maintaining it, with scarcely any variation, in the greatest extremes of heat and cold to which we are usually exposed. But there is, perhaps, no function of the body more extraordinary, than that by which it restores wounded and mutilated parts, and renovates the whole frame by the constant supply of fresh materials. This so evidently exceeds all known powers and properties of mere

matter, that we have nothing left but to ascribe it wholly to the living principle; which, having so much already laid to its charge, need not scruple to receive this additional burden. But, indeed it would be endless to enumerate every circumstance. We are made up of wonders; and the mind that can soar on the wings of contemplation through the utmost regions of space, is unable to analyse to the bottom one of the operations that are constantly carried on within its earthly tenement.

If we turn our attention to the vegetable kingdom, we shall find our progress arrested by similar difficulties. Vegetable life seems to be a no less mysterious and unintelligible principle than that of animals. No one pretends to say in what it consists. It forms the limit to our enquiries: and the ocean will probably as soon be able to overleap the boundaries assigned to it, as we to surmount this mighty barrier. How the sap is first formed in the root; how it rises through the stem; how it produces the growth of wood, or the formation of leaves; are enquiries that seem to lie beyond the reach of our faculties. Though we could discern the progress of these operations much more clearly than we do, we should have advanced no farther towards assigning the cause. When we say, that the sap ascends by capillary attraction, that heat or moisture stimulates the vessels to project it, concoct it, or assimilate it to their own substance; we merely solve one difficulty by introducing others: and in

using such terms we describe effects, whose causes are still far beyond our comprehension. Light and air are ascertained to be necessary to the healthy growth of plants; but why they are necessary, or how they contribute to vegetation, we may perhaps never be able to discover. Every blade of grass upon which we tread, is so wonderfully organised, as to mock all our efforts to investigate and explain it: it spurns our puny attempts, and compels us to stand at a distance, and gaze with admiration at the external magnificence of a Temple, which is too sacred to have its portals thrown open to our profane tread.

But there are other classes of natural productions, which, though not endued with life, are full of wonder, and will not reveal the secret of their formation to the keenest enquirer. The very earth on which we live, has been found to have a certain regularity of structure, which is supposed to take its origin in the operation of regular causes; and water and fire have been violently seized upon, and clamorously upheld, by their respective supporters, as the most probable causes that could be thought of. After all, when we talk of the earth's structure, we can do no more than scratch a little upon its surface; of its interior we can know nothing: but from what astronomers tell us of its density, which is much greater than the hardest known rock; it should seem, that the materials which compose its nucleus, must be very different from those which form its surface. Fire or water

may have been instrumental in altering and modifying its exterior characters; and it may be possible for us, by an examination of the effects, to determine, with a high degree of probability, where these agents have operated; but here we find our limit, without having probed the difficulty to the bottom; for how or why fire melts, and water dissolves, we shall probably never be able to ascertain. In examining the different mineral masses with which our earth presents us, we find ourselves quite unable to account for the manner in which their component elements are aggregated together, or what connexion there is between their internal composition, and external character. It has been proved, that diamond consists of pure carbon; but this discovery brings us no nearer to the cause of that peculiar hardness and brilliancy, which distinguish it from all other stones. In like manner, we can detect the materials of which common salt, rock crystal, or carbonate of lime, are composed; but this will not furnish us with any reason, why the first should choose to crystallize in the form of a cube, the second prefer that of a dodecahedron, or the third take a fancy to a rhomboid. But we go farther, and discover that all crystals have a primitive form; and see reason to conclude, that the primary particles which compose them, have a definite geometrical figure, so as to produce, by their aggregation, a regular crystal: but though we may trace something of the manner in which crystals are produced, the cause remains

as inexplicable as ever. In the third volume of Thomson's Chemistry, I find the following observations:—"All the particles of the same body "must be supposed to have the same figure; and "the combination of a determinate number of "similar bodies must produce similar figures. "Haüy has made it extremely probable that these "integrant particles always combine in the same "body in the same way, that is to say, that the "same faces, or the same edges, always attach "themselves together; but that these differ in "different crystals. This can scarcely be accounted "for, without supposing that the particles of bodies "are endowed with a certain polarity, which makes "them attract one part of another particle, and "repel the other parts. This polarity would "explain the regularity of crystallization; but it is "*itself inexplicable.*" Thus it is, that in our analysis of natural bodies, we pass from one cause to another, till we reach at last one that we cannot explain, which puts a stop to all further progress.

Chemistry opens the way to many new wonders. By teaching us to analyse the substances we meet with, into their component parts, it makes us better acquainted with the productions of nature, and gives us an insight into many of her laws and operations; but this acquaintance is at the best only partial, this insight incomplete. We find a law to exist, by which all chemical analysis is governed, which we call affinity or attraction; but of this power we can give no explanation: it

is the limit which we cannot pass. It is much more complicated and capricious than mechanical attraction, inasmuch as it consists in the arbitrary attachment which bodies exhibit for one substance rather than another; so that, when once we know which way their affections lie, we can prevail upon any substance to break off the most intimate connexion, by presenting it with a more beloved object than that with which it is now in union. Intimacies which have subsisted ever since the creation, are often dissolved by this means; and the faithless companion which has forsaken an old friend for a new one, will with equal fickleness desert its new ally, if it has the opportunity of forming a yet more agreeable connexion. But all this is very mysterious. No reason whatever can be assigned why lime, for instance, should choose to unite with muriatic acid, rather than with carbonic; or why it should prefer sulphuric acid to either of the others. It has been attempted to account for this law of affinity, by supposing, that the bodies which thus unite, are influenced by electrical attraction. Should there be any truth in this notion, it would remove the difficulty only one step; and the point we must stop at would then be, What is Electricity? We are equally at a loss to explain, why simple bodies should unite with each other only in definite proportions; so that when calcium has received a sufficient dose of oxygen to form lime, no solicitations will induce it to accept of an atom more. Here we again appear to be at the extremity of our

knowledge. It seems indeed, that the more our knowledge is extended, the more we become acquainted with our ignorance; because, in proportion as we push our scientific enquiries in different directions, we come in contact, as it were, with the barrier that shuts us in, at a greater number of points, and are thus made more sensible of its existence. Thus the ancients, who acknowledged only four elements, to which all other things were reducible, could not be so well aware of the limited nature of their knowledge, as we, who having made a much greater progress in science, reckon about fifty-seven substances whose composition is yet unknown; or in other words, touch upon our limits in so many different points.

Light is a substance which may perhaps be termed necessary to our existence; but it lies very nearly at the extreme range of our faculties. Something was done towards explaining its nature, by the discovery, that it is composed of the seven prismatic colours, and that its emission is not quite instantaneous, but with a velocity of 200,000 miles in a second. We have now learnt to attribute all colour to the action of light; but have little chance of knowing what is that property residing in the surface of bodies, which makes them reflect different colours; or what power it is in the Sun's rays, which in some cases, as in that of the human skin, deepens the colour of an object exposed to them; in others, as in the operation of bleaching, lessens, or wholly destroys it. The

properties of light are so singular, in having no independent existence, in penetrating with ease some of the densest substances, in being without weight, and incapable of confinement in any vessel for examination; that it is no wonder it should seem full of mystery to our limited perceptions. The discovery of the polarization of light, may be said in one sense to enlarge our knowledge of it; but it removes the limits to that knowledge but a little way, by showing us a property of light as inexplicable as any of the rest.

Much the same might be said, of heat, electricity, and magnetism: by the help of the two first, we try to explain many of the atmospheric phenomena, but they themselves remain all the time inexplicable. From the last, we derive most important practical benefits, and with these we may rest content; for when we attempt to theorize about it, we are lost in labyrinths of difficulty.

Though but a very cursory outline has been given, of the application of the principle which I laid down, to the different branches of science; yet enough perhaps has been said to explain my meaning; and I may therefore draw my observations to a conclusion, after briefly considering what has been proved, and the consequences that may be deduced from it.

I have endeavoured to show, that our knowledge both of mind and matter is extremely limited: by which I would be understood to mean, not that we may not, by proceeding from acknow-

ledged principles, build up a vast accumulation of knowledge, and carry the arts and sciences to a degree of perfection yet unthought of; but that, in an analytical examination of what we know, we soon come to certain first principles, elements, or laws of Nature; which, though claiming assent on account of their conformity with facts, are yet wholly beyond the reach of our faculties to explain. Their truth may often be undoubted, and so they may form the foundation of real knowledge; but their cause remains undiscovered; and thus they may serve to bring down our pride, and shew us within what narrow bounds our actual knowledge of things is confined.

The conclusion which naturally follows from the above observations, though laying no claim to novelty, is yet perhaps of sufficient importance to require no apology for its repetition. It is this: that we shall extend our knowledge of things much more certainly and advantageously, by the simple investigation of facts, than by a constant searching into causes, which may be beyond the grasp of our understanding. A careful examination of those substances, or those events, which nature presents to our view, will necessarily enable us to classify all objects of enquiry, and account for their changes, to such an extent as is necessary for promoting useful knowledge; but a too hasty generalization, and a too eager desire to search into hidden causes, without a sufficiently extensive induction of facts, not only tends to

make our researches frivolous, and our acquirements useless; but also is liable to the more serious charge, of checking the progress of science, by setting out with false principles; and paralysing the energies of discovery, by confining it within a beaten track; which, however sanctioned by authority, or endeared by prejudice, is repugnant to reason and truth. It was chiefly, perhaps, for want of recognising this principle, that the ancient Philosophers made such a wonderfully slow progress in the knowledge of things; and that Europe was overspread with that mental gloom during the middle ages, which has made them proverbial. The Greeks, who were the most polished and philosophical nation of antiquity, (unless we except the Egyptians, and the Indians, of whom we know very little), proceeded upon so arbitrary and erroneous a system, in the investigation of the phenomena of Nature; that it is no wonder their discoveries were trifling, and their notions incorrect. They first arranged all the objects of human knowledge under ten general heads, or classes, which were called *Categories*. These were Substance, Quality, Quantity, Relation, Action, Passion, When, Where, Position, and Habit. The next step was to consider, what could be predicated of Substance, or of this or that Quality, Quantity, Relation, &c. in the abstract. They found that there are but five classes of predicates in nature: these are Genus, Species, Difference, Property, and Accident. For instance, in the proposition,

"Man is an animal," the word *animal*, which is the predicate, or that which is affirmed of man, expresses the genus to which he belongs. In the proposition, "some knowledge is useless," *uselessness*, which is predicated of *some knowledge*, is its accident. This notable foundation of science being laid, nothing remained but to arrange the individual objects in nature under their proper categories, which was generally done in a very arbitrary manner; and then with the formality of a syllogism, to assign to each the predicate, which had before been attributed to the genus or species to which it belonged. By this way of proceeding, it is plain that no progress could be made in any useful science; for if the individual really belongs to the category under which it is placed, we add nothing to our stock of knowledge, by affirming or denying of it, what we had before affirmed or denied of the whole genus; and if it belong not to the category under which we place it, our syllogising will only give the appearance of proof to that which must be an absolute falsehood. Yet this mode of philosophizing spread from Greece over the greater part of the world, and oppressed with its leaden weight the intellect of man; until Lord Bacon arose to expose its futility, and call the attention of men to rational principles, and the real investigation of nature. The design of his Novum Organum is to point out the proper method of interpreting nature. He says, "A syl-"logism is formed of propositions, propositions of

"words, and words are the symbols of ideas; so "that, if our ideas, (which are the very foundation "of knowledge), be confused and carelessly "abstracted from things, there can be no solidity "in the superstructure which is raised upon them. "Therefore our only hope is in a fair induction." The views of this great man are so consonant to truth and reason, that they have generally been embraced, and acted upon, by the Philosophers who have succeeded him; and we may consider it to be chiefly owing to him, that a method of Philosophy has been adopted, which, established on the firm basis of experiment, must command the admiration, and direct the energies, of civilized man, as long as facts are preferred to opinions; and must contribute to enlarge the sphere of his knowledge, and consequent power, as long as there are dominions of science to be explored, and realms of intellect to be conquered. It required a mind of no ordinary strength to combat prejudices, and dispute authorities, which had swayed the minds of men for ages; and though the true mode of interpreting nature now seems most clear and obvious; yet we must not forget how large a debt of gratitude is due to the bold and adventurous pioneers of learning, who first cleared away the rubbish, which choked up all the avenues to useful knowledge, and opened a path to regions of light and beauty, of which the subsequent conquest was comparatively an easy task. But the mind of man is naturally so eager to arrive at

some agreeable result of its labour; that in all times there are persons, who assign causes, and construct theories, before they have examined a sufficient number of facts to authorise their conclusion, (and we see instances of this in the writings of the immortal Bacon himself,) the fault of which is, that it gives a bias to the mind, by which it is induced to distort the facts which afterwards come under observation, so as to make them agree with a preconceived opinion. This of course can only perpetuate error, instead of leading us to truth; and therefore it was found necessary to reject the absurdities of the alchemists, before chemistry could enter upon the career of useful discovery; and to discard the dogmas of Aristotle, before Philosophy could be made instrumental in bringing us to the knowledge of things. But though it is not always an easy thing, to preserve the mind unfettered by early prejudice, or attachment to some favourite theory; yet this must be done to the utmost degree that is possible, if we would not exchange the steady brilliancy of truth, for the flickering glare of some passing meteor. This necessity is generally acknowledged, though not so universally practiced; and the consequence of the diffusion of more correct views, and the excitement of a corresponding spirit of enquiry, has been, that of late years, knowledge of every kind has advanced with a rapidity truly astonishing. We seem to be living in a period, when means are used for subverting the empire of ignorance and

error, such as the world never witnessed before. Science and Art are achieving triumphs which could not have been dreamt of a century ago. Useful information is spreading in every class of society; and let us hope, that as the mighty tide rolls on, the heart, as well as the intellect, may be improved by the blessings which it bears on its bosom; and that the most refined learning may be the concomitant to the purest happiness.

THE END.

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A

DISCOURSE

OF THE

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ADVANTAGES, AND PLEASURES

OF

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OBJECTS,

ADVANTAGES, AND PLEASURES

OF

SCIENCE.

INTRODUCTION.
I. MATHEMATICAL SCIENCE.
II. DIFFERENCE BETWEEN MATHEMATICAL AND PHYSICAL TRUTHS.
III. NATURAL OR EXPERIMENTAL SCIENCE.
IV. APPLICATION OF NATURAL SCIENCE TO THE ANIMAL AND VEGETABLE WORLD.
V. ADVANTAGES AND PLEASURES OF SCIENCE.

IN order fully to understand the advantages and the pleasures which are derived from an acquaintance with any Science, it is necessary to become acquainted with that science, and it would therefore be impossible to convey a complete knowledge of the benefits conferred by a study of the various sciences which have hitherto been chiefly cultivated by philosophers, without teaching all the branches of them. But a very distinct idea may be given of those benefits, by explaining the nature and objects of the different sciences; it may be shown by examples how much use and gratification there is in learning a part of any one branch of knowledge; and it may thus be inferred, how great reason there is to learn the whole.

It may easily be demonstrated, that there is an advantage in learning, both for the usefulness and the pleasure of it. There is something positively agreeable to all men, to all at least whose nature is not most grovelling and base, in gaining knowledge for its own sake. When you see any thing for the first time, you at once derive some gratification from the sight being new; your attention is awakened, and you desire to know more about it. If it is a piece of workmanship, as an instrument, a machine of any kind, you wish to know how it is made; how it works; and what use it is of. If it is an animal, you desire to know where it comes from; how it lives; what are its dispositions, and, generally, its nature and habits. This desire is felt, too, without at all considering that the machine or the animal may ever be of the least use to yourself practically; for, in all probability, you may never see them again. But you feel a curiosity to learn all about them, because they are new and unknown to you. You accordingly make inquiries; you feel a gratification in getting answers to your

questions, that is, in receiving information, and in knowing more,—in being better informed than you were before. If you ever happen again to see the same instrument or animal, you find it agreeable to recollect having seen it before, and to think that you know something about it. If you see another instrument or animal, in some respects like, but differing in other particulars, you find it pleasing to compare them together, and to note in what they agree, and in what they differ. Now, all this kind of gratification is of a pure and disinterested nature, and has no reference to any of the common purposes of life; yet it is a pleasure—an enjoyment. You are nothing the richer for it; you do not gratify your palate or any other bodily appetite; and yet it is so pleasing that you would give something out of your pocket to obtain it, and would forego some bodily enjoyment for its sake. The pleasure derived from science is exactly of the like nature, or, rather, it is the very same. For what has just been referred to is in fact Science, which in its most comprehensive sense only means *Knowledge*, and in its ordinary sense means *Knowledge reduced to a System*; that is, arranged in a regular order, so as to be conveniently taught, easily remembered, and readily applied.

The practical uses of any science or branch of knowledge are undoubtedly of the highest importance; and there is hardly any man who may not gain some positive advantage in his worldly wealth and comforts, by increasing his stock of information. But there is also a pleasure in seeing the uses to which knowledge may be applied, wholly independent of the share we ourselves may have in those practical benefits. It is pleasing to examine the nature of a new instrument, or the habits of an unknown animal, without considering whether they may be of use to ourselves or to any body. It is another gratification to extend our inquiries, and find that the instrument or animal is useful to man, even although we have no chance ourselves of ever benefiting by the information: as, to find that the natives of some distant country employ the animal in travelling;—nay, though we have no desire of benefiting by the knowledge; as, for example, to find that the instrument is useful in performing some dangerous surgical operation, The mere gratification of curiosity; the knowing more to-day than we knew yesterday; the understanding what before seemed obscure and puzzling; the contemplation of general truths, and the comparing together of different things,—is an agreeable occupation of the mind; and, beside the present enjoyment, elevates the faculties above low pursuits, purifies and refines the passions, and helps our reason to assuage their violence.

It is very true, that the fundamental lessons of philosophy may to many at first sight wear a forbidding aspect, because to comprehend them requires an effort of the mind somewhat, though certainly not much, greater than is wanted for understanding more ordinary matters; and the most important branches of philosophy, those which are of the most general application, are for that very reason the less easily followed, and the less entertaining when apprehended, presenting as they do few particulars and individual objects to the mind. In discoursing of them, moreover, no figures will be at present used to assist the imagination; the appeal is made to reason, without help from the senses,

But be not therefore prejudiced against the doctrine, that the pleasure of learning the truths which philosophy unfolds is truly above all price. Lend but a patient attention to the principles explained, and giving us credit for stating nothing which has not some practical use belonging to it, or some important doctrine connected with it, you will soon perceive the value of the lessons you are learning, and begin to interest yourselves in comprehending and recollecting them; you will find that you have actually learnt something of science, while merely engaged in seeing what its end and purpose is; you will be enabled to calculate for yourselves, how far it is worth the trouble of acquiring, by examining samples of it; you will, as it were, taste a little to try whether or not you relish it, and ought to seek after more; you will enable yourselves to go on, and enlarge your stock of it; and after having first mastered a very little, you will proceed so far as to look back with wonder at the distance you have reached beyond your earliest acquirements.

The Sciences may be divided into three great classes: those which relate to *Number and Quantity*, those which relate to *Matter*, and those which relate to *Mind*. The first are called the *Mathematics*, and teach the properties of numbers and of figures; the second are called *Natural Philosophy*, and teach the properties of the various bodies which we are acquainted with by means of our senses; the third are called *Intellectual* or *Moral Philosophy*, and teach the nature of the mind, of the existence of which we have the most perfect evidence in our own reflections; or, in other words, the moral nature of man, both as an individual and as a member of society. Connected with all the sciences, and subservient to them, though not one of their number, is *History*, or the record of facts relating to all kinds of knowledge.

I. The two great branches of the *Mathematics*, or the two mathematical sciences, are *Arithmetic*, the science of number, from the Greek word signifying *number*, and *Geometry*, the science of figure, from the Greek words signifying *measure of the earth*,—land measuring having first turned men's attention to it.

When I say that 2 and 2 make 4, I state an arithmetical proposition, very simple indeed, but connected with many others of a more difficult and complicated kind. Thus, it is another proposition, somewhat less simple, but still very obvious, that 5 multiplied by 10, and divided by 2 is equal to, or makes the same number with, 100 divided by 4—both results being equal to 25. So, to find how many farthings there are in 1000*l*., and how many minutes in a year, are questions of arithmetic which we learn to work by being taught the principles of the science one after another, or, as they are commonly called, the *rules* of addition, subtraction, multiplication, and division. Arithmetic may be said to be the most simple, though among the most useful of the sciences; but it teaches only the properties of particular and known numbers, and it only enables us to add, subtract, multiply, and divide those numbers. But suppose we wish to add, subtract, multiply, or divide numbers which we have not yet ascertained, and in all respects to deal with them as if they were known, for the purpose of arriving at certain conclusions respecting them, and among other things, of

discovering what they are; or, suppose we would examine properties belonging to all numbers; this must be performed by a peculiar kind of arithmetic, called *universal* arithmetic, or *Algebra*.* The common arithmetic, you will presently perceive, carries the seeds of this most important science in its bosom. Thus, suppose we inquire what is the number which multiplied by 5 makes 10? this is found if we divide 10 by 5—it is 2; but suppose that, before finding this number 2, and before knowing what it is, we would add it, whatever it may turn out, to some other number; this can only be done by putting some mark, such as a letter of the alphabet, to stand for the unknown number, and adding that letter as if it were a known number. Thus, suppose we want to find two numbers, which, added together, make 9, and multiplied by one another make 20. There are many, which added together, make 9; as 1 and 8; 2 and 7; 3 and 6; and so on. We have, therefore, occasion to use the second condition, that multiplied by one another they should make 20, and to work upon this condition before we have discovered the particular numbers. We must, therefore, suppose the numbers to be found, and put letters for them, and by reasoning upon those letters, according to both the two conditions of adding and multiplying, we find what they must each of them be in numbers, in order to fulfil or answer the conditions. Algebra teaches the rules for conducting this reasoning, and obtaining this result successfully; and by means of it we are enabled to find out numbers which are unknown, and of which we only know that they stand in certain relations to known numbers, or to one another. The instance now taken is an easy one; and you could, by considering the question a little, answer it readily enough; that is, by trying different numbers, and seeing which suited the conditions; for you plainly see that 5 and 4 are the two numbers sought; but you see this by no certain or general rule applicable to all cases, and therefore you never could work more difficult questions in the same way; and even questions of a moderate degree of difficulty would take an endless number of trials or guesses to answer. Thus, if a ship, say a smuggler, is sailing at the rate of 8 miles an hour, and a revenue cutter, sailing at the rate of 10 miles an hour, descries her 18 miles off, and gives chase, and you want to know in what time the smuggler will be overtaken, and how many miles she will have sailed before being overtaken; this, which is one of the simplest questions in algebra, would take you a long time, almost as long as the chase, to come at by mere trial and guessing (the chase would be 9 hours, and the smuggler would sail 72 miles:) and questions only a little more difficult than this, never could be answered by any number of guesses; yet questions infinitely more difficult can easily be solved by the rules of algebra. In like manner, by arithmetic you can tell the properties of particular numbers; as, for instance, that the number 348 is divided by 3 exactly, so as leave nothing over: but algebra teaches us that it is only one of an infinite variety of numbers, all divisible by 3, and any one of which you can tell the moment you see it; for they all have the remarkable property, that if you add together the figures they consist of, the sum total is divisible by 3. You can easily perceive

* Algebra, from the Arabic words signifying the *reduction of fractions*; the Arabs having brought the knowledge of it into Europe.

this in any one case, as in the number mentioned, for 3 added to 4 and that to 8 make 15, which is plainly divisible by 3; and if you divide 348 by 3, you find the quotient to be 116, and nothing over. But this does not at all prove that any other number, the sum of whose figures is divisible by 3, will itself also be found divisible by 3, as 741; for you must actually perform the division here, and in every other case, before you can know that it leaves nothing over. Algebra, on the contrary, both enables you to discover such general properties, and to prove them in all their generality.*

By means of this science, and its various applications, the most extraordinary calculations may be performed. We shall give, as an example, the method of *Logarithms*, which proceeds upon this principle. Take a set of numbers going on by equal differences; that is to say, the third being as much greater than the second, as the second is greater than the first; thus, 1, 2, 3, 4, 5, 6, and so on, in which the common difference is 1; then take another set of numbers, such that each is equal to twice or three times the one before it, or any number of times the one before it; thus, 2, 4, 8, 16, 32, 64, 128; write this second set of numbers under the first, or side by side, so that the numbers shall stand opposite to one another thus,

1	2	3	4	5	6	7
2	4	8	16	32	64	128

you will find, that if you add together any two of the upper or first set, and go to the number opposite their sum, in the lower or second set, you will have in this last set the number arising from multiplying together the numbers of the lower set corresponding to the numbers added together. Thus, add 2 to 4, you have 6 in the upper set, opposite to which in the lower set is 64, and multiplying the numbers 4 and 16 opposite to 2 and 4, the product is 64. In like manner, if you subtract the upper numbers, and look for the lower numbers opposite to their difference, you obtain the quotient of the lower numbers opposite the number subtracted. Thus, take 4 from 6 and 2 remains, opposite to which you have in the lower line 4; and if you divide 64, the number opposite to 6, by 16, the number opposite to 4, the quotient is 4. The upper set are called the *logarithms* of the lower set, which are called *natural numbers*: and tables may, with a little trouble, be constructed, giving the logarithms of all numbers from 1 to 10,000 and more; so that, instead of multiplying or dividing one number by another, you have only to add or subtract their logarithms, and then you at once find the product or the quotient in the tables. These are made applicable to numbers far higher than any actually in them, by a very simple process; so that you may at once perceive the prodigious saving of time and labour which is thus made. If you had, for instance, to multiply

* Another class of numbers divisible by 3 is discovered in like manner by algebra. Every number of 3 places, the figures (or digits) composing which are in arithmetical progression, (or rise above each other by equal differences,) is divisible by 3: as, 123, 789, 357, 159, and so on. The same is true of numbers of any amount of places, provided they are composed of 3, 6, 9, &c. numbers rising above each other by equal differences, as 289, 299, 309, or 148, 214, 280, 346, or 307142085345648276198756, which number of 24 places is divisible by 3, being composed of 6 numbers in a series whose common difference is 1137.

7,543,283 by itself, and that product again by the original number, you would have to multiply a number of seven places of figures by an equally large number, and then a number of 14 places of figures by one of seven places, till at last you had a product of 21 places of figures—a very tedious operation; but working by logarithms, you would only have to take three times the logarithm of the original number, and that gives the logarithm of the last product of 21 places of figures, without any further multiplication. So much for the time and trouble saved, which is still greater in questions of division; but by means of logarithms many questions can be worked, and of the most important kind, which no time or labour would otherwise enable us to solve.

Geometry teaches the properties of figure, or particular portions of space, and distances of points from each other. Thus, when you see a triangle, or three-sided figure, one of whose sides is perpendicular to another side, you find, by means of geometrical reasoning respecting this kind of triangle, that if squares be drawn on its three sides, the large square upon the slanting side opposite the two perpendiculars, is exactly equal to the two smaller squares upon the perpendiculars, taken together; and this is absolutely true, whatever be the size of the triangle, or the proportions of its sides to each other. Therefore, you can always find the length of any one of the three sides by knowing the lengths of the other two. Suppose one perpendicular side to be 10 feet long, the other 6, and you want to know the length of the third side opposite to the perpendiculars, you have only to find a number such, that if multiplied by itself, it shall be equal to 10 times 10, together with 6 times 6, that is 136. (This number is between $11\frac{1}{4}$ and $11\frac{1}{2}$.) Now only observe the great advantage of knowing this property of the triangle, or of perpendicular lines. If you want to measure a line passing over ground which you cannot reach—to know, for instance, the length of one side covered with water of a field, or the distance of one point on a lake or bay from the opposite side—you can easily find it by measuring two lines perpendicular to one another on the dry land, and running through the two points; for the line wished to be measured, and which runs through the water, is the third side of a perpendicular-sided triangle, the other two sides of which are ascertained. But there are other properties of triangles, which enable us to know the length of two sides of any triangle, whether it has perpendicular sides or not, by measuring one side and also measuring the inclination of the other two sides to this side, or what is called the two angles made by those sides with the measured side. Therefore you can easily find the perpendicular *line* drawn or supposed to be drawn from the top of a mountain through it to the bottom, that is the height of the mountain; for you can measure a line on level ground, and also the inclination of two lines, supposing them drawn in the air, and reaching from the ends of the measured lines to the mountain's top; and having thus found the length of the one of those lines next the mountain, and its inclination to the ground, you can at once find the perpendicular, though you cannot possibly get near it. In the same way, by measuring lines and angles on the ground, and near, you can find the length of lines at a great distance, and which

you cannot get near: for instance, the length and breadth of a field on the opposite side of a lake or sea; the distance of two islands, or the space between the tops of two mountains.

Again, there are curve-lined figures as well as straight, and geometry teaches the properties of these also. The best known of all the curves is the circle, or a figure made by drawing a string round a fixed point, and marking where its other end traces, so that every part of the circle is equally distant from the fixed point or centre. From this fundamental property, an infinite variety of others follow by steps of reasoning more or less numerous, but all necessarily arising one out of another. To give an instance; it is proved by geometrical reasoning, that if from the two ends of any diameter of the circle you draw two lines to meet in any one point of the circle whatever, those lines are perpendicular to each other. Another property, and a most useful one is, that the sizes, or areas, of all circles whatever, from the greatest to the smallest, from the sun to a watch-dial-plate, are in exact proportion to the squares of their distances from the centre; that is, the squares of the strings they are drawn with: so that if you draw a circle with a string 5 feet long, and another with a string 10 feet long, the large circle is four times the size of the small one, as far as the space or area enclosed is concerned; the square of 10 or 100 being four times the squares of 5 or 25. But it is also true, that the lengths of the circumferences themselves, the number of feet over which the ends of the strings move, are in proportion to the lengths of the strings; so that the curve of the larger circle is only twice the length of the curve of the lesser.

But the circle is only one of an infinite variety of curves, all having a regular formation and fixed properties. The *oval* or *ellipse* is, perhaps, next to the circle, the most familiar to us, although we more frequently see another curve line formed by the motions of bodies thrown forward. When you drop a stone, or throw it straight up, it goes in a straight line; when you throw it forward, it goes in a curve line till it reaches the ground; as you may see by the figure in which water runs when forced out of a pump, or from a fire-pipe, or from the spout of a kettle or tea-pot. The line it moves in is called a *parabola*; every point of which bears a certain fixed relation to a certain point within it, as the circle does to its centre. Geometry teaches various properties of this curve; for example, that if the direction in which the stone is thrown, or the bullet fired, or the water spouted, be half the perpendicular to the ground, that is, half way between being level with the ground and being upright, the curve will come to the ground at a greater distance than if any other direction whatever were given, with the same force. So that to make the gun carry furthest, or the fire-pipe play to the greatest distance, they must be pointed, not as you might suppose, level or point blank, but about half way between that direction and the perpendicular. If the air did not resist, and so somewhat disturb the calculation, the direction to give the longest range ought to be exactly half perpendicular.

The *oval*, or *ellipse*, is drawn by taking a string of any certain length, and fixing, not one end as in drawing the circle, but both ends, and then carrying a point, as a pencil or chalk, round inside the string,

always keeping it stretched as far as possible. It is plain, that this figure is as regularly drawn as the circle, though it is very different from it; and you perceive that every point of its curve must be so placed, that the straight lines drawn from it to the two points where the string was fixed, are, when added together, always the same; for they make together the length of the string. Among various properties belonging to this curve, in relation to the straight lines drawn within it, is one which gives rise to the construction of the *trammels* or elliptic compasses used for making figures and ornaments of this form; and also to the construction of lathes for turning oval frames, and the like.

If you wish at once to see these three curves, take a sugar-loaf, and cut it any where clean through in a direction parallel to its base or bottom; the outline or edge of the loaf where it is cut will be a *circle.* If the cut is made so as to slant, and not be parallel to the base of the loaf, the outline is an *ellipse*, provided the cut goes quite through the sides of the loaf all round; but if it goes slanting, and parallel to the line of the loaf's side, the outline is a *parabola;* and if you cut in any direction not through the sides all round, but through the sides and base, and not parallel to the line of the side, the outline will be another curve of which we have not yet spoken, but which is called an *hyperbola.* You will see another instance of it, if you take two plates of glass, and lay them on one another; then put their edge in water, holding them upright and pressing them together; the water, which, to make it more plain, you may colour with a few drops of ink or strong tea, rises to a certain height, and its outline is this curve; which, however much it may seem to differ in form from a circle or ellipse, is found by mathematicians to resemble them very closely in many of its most remarkable properties.

These are the curve lines best known and most frequently discussed; but there are an infinite number of others all related to straight lines and other curve lines by certain fixed rules; for example, the course which any part, as the nail in the felly of a wheel rolling along takes through the air, is a curve called the *cycloid*, which has many remarkable properties; and, among others, this, that it is, of all lines possible, the one in which any body not falling perpendicularly, will descend from one point to another the most quickly.

II. You perceive, if you reflect a little, that the science which we have been considering in both its branches, has nothing to do with matter; that is to say, it does not at all depend upon the properties or even upon the existence of any bodies or substances whatever. The distance of one point or place from another is a straight line; and whatever is proved to be true respecting this line, as, for instance, its proportion to other lines of the same kind, and its inclination towards them, what we call the angles it makes with them, would be equally true whether there were any thing in those places, at those two points, or not. So if you find the number of yards in a square field, by measuring one side, 100 yards, and then, multiplying that by itself, which makes the whole area 10,000 square yards, this is equally true whatever the field is, whether corn or grass, or rock or water; it is equally true if the

solid part, the earth or water, be removed, for then it would be a field of air bounded by four walls or hedges; but suppose the walls or hedges were removed, and a mark only left at each corner, still it would be true that the space enclosed or bounded by the lines supposed to be drawn between the four marks was 10,000 square yards in size. But the marks need not be there; you only want them while measuring one side; if they were gone, it would be equally true that the lines, supposed to be drawn from the places where the marks had been, enclose 10,000 square yards of air. But if there were no air, and consequently a mere void, or empty space, it would be equally true that this space is of the size you had found it to be by measuring the distance of one point from another, of one of the space's corners or angles from another, and then multiplying that distance by itself. In the same way it would be true, that if the space were circular, its size, compared with another circular space of half its diameter, would be four times larger; of one third its diameter, nine times larger, and of one fourth sixteen times, and so on always in proportion to the squares of the diameters; and that the length of the circumference, the number of feet or yards in the line round the surface, would be twice the length of a circle whose diameter was one half, thrice the circumference of one whose diameter was one third, four times the circumference of one whose diameter was one fourth, and so on, in the simple proportion of the diameters. Therefore every property which is proved to belong to figures belongs to them without the smallest relation to bodies or matter of any kind, although we generally see figures in connection with bodies; but all those properties would be equally true, if no such thing as matter or bodies existed; and the same may be said of the properties of number, the other great branch of the mathematics. When we speak of twice two, and say it makes four, we affirm this without thinking of two horses, or two balls, or two trees; but two of any thing and every thing equally. Nay, this branch of mathematics may be said to apply still more extensively than even the other; for it has no relation to space, which geometry has; and, therefore, it is applicable to cases where figure and size are wholly out of the question. Thus you can speak of two dreams, or two ideas, or two minds, and can calculate respecting them just as you would respecting so many bodies; and the properties you find belonging to numbers, will belong to those numbers when applied to things that have no outward or visible or perceivable existence, and cannot even be said to be in any particular place, just as much as the same numbers applied to actual bodies which may be seen and touched.

It is quite otherwise with the science which we are now going to consider, *Natural Philosophy*. This teaches the nature and properties of actually existing substances, their motions, their connections with each other, and their influence on one another. It is sometimes also called *Physics*, from the Greek word signifying *Nature*, though that Greek word is more frequently, in common speech, confined to one particular branch of the science, concerning the bodily health.

We have mentioned one distinction between Mathematics and Natural Philosophy, that the former does not depend on the nature and existence of bodies, which the latter entirely does. Another distinc-

tion, and one closely connected with this, is, that the truths which Mathematics teach us are *necessarily* such,—they are truths of themselves, and wholly independent of facts and experiments,—they depend only upon reasoning; and it is utterly impossible they should be otherwise than true. This is the case with all the properties which we find belong to numbers and to figures—2 and 2 must of *necessity*, and through all time, and in every place, be equal to 4; those numbers must *necessarily* be always divisible by 3 without leaving any remainder over, which have the sums of the figures they consist of divisible by 3; and circles must *necessarily*, and for ever and ever, be to one another in the exact proportion of the squares of their diameters. It cannot be otherwise; we cannot conceive it in our minds to be otherwise. No man can in his own mind suppose to himself that 2 and 2 should ever be more or less than 4; it would be an utter impossibility—a contradiction in the very ideas. The other properties of number, though not so plain at first sight as this, are proved to be true by reasoning, every one step of which follows from the step immediately before, as a matter of course, and so clearly and unavoidably, that it cannot be supposed or even imagined to be otherwise; the mind has no means of fancying how it could be otherwise: the final conclusion from all the steps of the reasoning or demonstration, as it is called, follows in the same way from the last of the steps, and is therefore just as evidently and necessarily true as the first step, which is always something self-evident, as that 2 and 2 make 4, or that the whole is greater than any of its parts, but equal to all its parts put together. It is by this kind of reasoning, step by step, from the most plain and evident things, that we arrive at the knowledge of other things which seem at first not true, or at least not generally true; but when we do arrive at them, we perceive that they are just as true, and for the same reasons, as the first and most obvious matters; that their truth is absolute and necessary, and that it would be as absurd and self-contradictory to suppose they ever could, under any circumstances, be not true, as to suppose that 2 added to 2 could ever make 3, or 5, or 100, or any thing but 4; or, which is the same thing, that 4 should ever be equal to 3, or 5, or 100, or any thing but 4. To find out these reasonings, to pursue them to their consequences, and thereby to discover the truths which are not immediately evident, is what science teaches us; but when the truth is once discovered, it is as certain and plain by the reasoning, as the first truths themselves from which all the reasoning takes its rise, on which it all depends, and which require no proof because they are self-evident at once, the instant they are understood.

But it is quite different with the truths which Natural Philosophy teaches. All these depend upon matter of fact; and that is learnt by observation and experiment, and never could be discovered by reasoning at all. If a man were shut up in a room with pen, ink, and paper, he might by thought discover any of the truths in arithmetic, algebra, or geometry; it is possible, at least; there would be nothing absolutely impossible in his discovering all that is now known of these sciences; and if his memory were as good as we are supposing his judgment and conception to be, he might discover it all without pen, ink, and paper, and in a dark room. But we cannot discover a single one of the funda-

mental properties of matter without observing what goes on around us, and trying experiments upon the nature and motion of bodies. Thus, the man whom we have supposed shut up could not possibly find out beyond one or two of the very first properties of matter, and those only in a very few cases; so that he could not tell if these were general properties of all matter or not. He could tell that the objects he touched in the dark were hard and resisted his touch; that they were extended and were solid; that is, that they had three dimensions, length, breadth, and thickness. He might guess that other things existed beside those he felt, and that those other things resembled what he felt in these properties, but he could know nothing for certain, and could not even conjecture much beyond *this* very limited number of qualities. He must remain utterly ignorant of what really exists in nature, and of what properties matter in general has. These properties, therefore, we learn by experience; they are such as we know bodies to have; they happen to have them—they are so formed by Divine Providence as to have them—but they might have been otherwise formed; the great Author of Nature might have thought fit to make all bodies different in every respect. We see that a stone dropped from our hand falls to the ground; this is a fact which we can only know by experience; before observing it, we could not have guessed it, and it is quite *conceivable* that it should be otherwise: for instance, that when we remove our hand from the body it should stand still in the air; or fly upward, or go forward, or backward, or sideways; there is nothing at all absurd, contradictory, or inconceivable in any of these suppositions; there is nothing impossible in any of them, as there would be in supposing the stone equal to half of itself, or double of itself; or both falling down and rising upwards at once; or going to the right and the left at one and the same time. Our only reason for not at once thinking it quite conceivable that the stone should stand in the air, or fly upwards, is, that we have never seen it do so, and have become accustomed to see it do otherwise. But for that, we should at once think it as natural that the stone should fly upwards or stand still, as that it should fall. But no degree of reflection for any length of time could accustom us to think 2 and 2 equal to any thing but 4, or the whole to be equal to a part.

After we have once by observation or experiment ascertained certain things to exist in fact, we may then reason upon them by means of mathematics; that is, we may apply mathematics to our experimental philosophy, and then such reasoning becomes absolutely certain, taking the fundamental facts for granted. Thus, if we find that a stone falls in one direction when dropped, and we further observe the peculiar way in which it falls, that is, quicker and quicker every instant till it reaches the ground, we learn the rule or the proportion by which the quickness goes on increasing; and we further find, that if the same stone is pushed forward on a table, it moves in the direction of the push, till it is either stopped by something, or comes to a pause, by rubbing against the table, and being hindered by the air. These are all facts which we learn by observing and trying, and they might all have been different if matter and motion had been otherwise constituted; but supposing them to be as they are, and as we find them, we can, by

reasoning mathematically from them, find out many most curious and important truths depending upon these facts, and depending upon them not accidentally, but of necessity. For example, we can find, in what course the stone will move, if, instead of being dropped to the ground, it is thrown forward: it will go in the curve already mentioned, the parabola, and it will run through that curve in a peculiar way, so that there will always be a certain proportion between the time it takes and the space it moves through, and the time it would have taken, and the space it would have moved through had it fallen from the hand to the ground. So we can prove, in like manner, what we before stated of the relation between the distance at which it will come to the ground, and the direction it is thrown in; the distance being greatest of all when the direction is nearly half way between the level or horizontal and the upright or perpendicular. These are mathematical truths, derived by mathematical reasoning upon physical grounds; that is, upon matter of fact found to exist by actual observation and experiment. The result, therefore, is necessarily true, and proved to be so by reasoning only, provided we have once ascertained the facts; but taken altogether, the result depends partly on the facts learned by experiment or experience, partly on the reasoning from these facts. Thus it is found to be true by reasoning, and necessarily true, that *if* the stone falls in a certain way when unsupported, it must when thrown forward go in the curve called a parabola: this is a necessary or mathematical truth, and it cannot possibly be otherwise. But when we state the matter without any supposition,—without any "*if*,"—and say, a stone thrown forward goes in the curve called a parabola, we state a truth, partly fact, and partly drawn from reasoning on the fact; and it might be otherwise if the nature of things were different. It is called a proposition or truth in Natural Philosophy; and as it is discovered and proved by mathematical reasoning, it is sometimes called a proposition or truth in the *Mixed Mathematics*. The man in the dark room could never discover this truth unless he had been first informed, by those who had observed the fact, in what way the stone falls when unsupported, and moves along the table when pushed. These things he never could have found out by reasoning: they are facts, and he could only reason from them after learning them, by his own experience, or taking them on the credit of other people's experience. But having once so learnt them, he could discover by reasoning merely, and with as much certainty as if he lived in daylight, and saw and felt the moving body, that the motion is in a parabola, and governed by certain rules. As experiment and observation are the great sources of our knowledge of Nature, and as the judicious and careful making of experiments is the only way by which her secrets can be known, Natural and Experimental Philosophy mean one and the same thing; mathematical reasoning being applied to certain branches of it, particularly those which relate to motion and pressure.

III. *Natural Philosophy*, in its most extensive sense, has for its province the investigation of the laws of matter; that is, the properties and the motions of matter; and may be divided into two great branches. The first and most important (which is sometimes on that account called

Natural Philosophy, but more properly *Mechanical Philosophy,)* investigates the sensible motions of all bodies. The second investigates the constitution and qualities of all bodies, and has various names, according to its different objects. It is called *Chemistry*, if it teaches the properties of bodies with respect to heat, mixture together, weight, taste, appearance, and so forth: *Anatomy* and *Animal Physiology*, if it teaches the structure and functions of living bodies, especially the human, for when it shows those of other animals, we term it *Comparative Anatomy: Medicine*, if it teaches the nature of diseases, and the means of preventing them and of restoring health: *Zoology*, (from the Greek words signifying *to speak of animals,*) if it teaches the arrangement or classification and the habits of the different lower animals: *Botany*, if it teaches the arrangement or classification and habits of plants: *Geology*, (from the Greek words meaning *to speak of the earth,*) including *Mineralogy*, if it teaches the arrangement of minerals, the structure of the masses in which they are found, and of the earth composed of those masses. The term *Natural History* is given to the three last branches taken together, but chiefly as far as relates to the classification of different things, or the observation of the resemblances and differences of the various animals, plants, and inanimate and ungrowing substances in nature.

But here we may make two general observations. The *first* is, that every such distribution of the sciences is necessarily imperfect; for one runs unavoidably into another. Thus, Chemistry shows the qualities of plants with relation to other substances, and to each other; and Botany does not overlook those same qualities, though its chief object be arrangement. So Mineralogy, though principally conversant with classifying metals and earths, yet regards also their qualities in respect of heat and mixture. So, too, Zoology, beside arranging animals, describes their structures, like Comparative Anatomy. In truth, all arrangement and classifying depends upon noting the things in which the objects agree and differ; and among those things, in which animals, plants, and minerals agree, must be considered the anatomical qualities of the one and the chemical qualities of the other. From hence, in a great measure, follows the *second* observation, namely, that the sciences mutually assist each other. We have seen how Arithmetic and Algebra aid Geometry, and how both the purely Mathematical Sciences aid Mechanical Philosophy. Mechanical Philosophy, in like manner, assists, though, in the present state of our knowledge, not very considerably, both Chemistry and Anatomy, especially the latter; and Chemistry very greatly assists both Physiology, Medicine, and all the branches of Natural History.

The first great head, then, of Natural Science, is Mechanical Philosophy; and it consists of various subdivisions, each forming a science of great importance. The most essential of these, and which is indeed fundamental, and applicable to all the rest, is called *Dynamics*, from the Greek word signifying *power* or *force*, and it teaches the laws of motion in all its varieties. The case of the stone thrown forward, which we have already mentioned more than once, is an example. Another, of a more general nature, but more difficult to trace, and far more important in its consequences, and of which, indeed, the former

is only one particular case, relates to the motions of all bodies, which are attracted (or influenced, or drawn) by any power towards a certain point, while they are, at the same time, driven forward by some push given to them at first, and continuing to act on them while they are drawn towards the point. The line in which a body moves while so drawn and so driven, depends upon the force it is pushed with, the direction it is pushed in, and the kind of power that draws it towards the point; but, at present, we are chiefly to regard the latter circumstance, the attraction towards the point. If this attraction be uniform, that is, the same at all distances from the point, the body will move in a circle, and the point to which it is constantly drawn will be the centre of the circle. Thus, a stone in a sling, when whirled round the hand, moves for this reason in a circle, while it remains in the sling; the force that draws it towards the hand being always the same, and the hand either stopping after setting the stone a-whirling, in which case it is the centre of the circle, or going round in a smaller circle, in which case the point is the centre of the two circles, the one the stone whirls round in, and the one the hand moves round in. (Of course we speak not now of the line the stone moves in after leaving the sling; that is a parabola, as before stated.) If the force that draws the moving body changes at different distances, so as to make the body move quicker, by drawing it more strongly towards the point, the nearer it is to that point, then the body will move, not in a circle, but in other curve lines of various kinds, according as the proportion of the force to the distance varies, and according also to the direction of the forward push, and the force with which it was originally given. If the force drawing towards the point is such, that, at two feet from the point, it is four times less than at one foot; at three feet, nine times less; at four feet, sixteen times less; and so on, always lessening in the same proportion, that is, as the squares of the distances increase; and if the body is pushed forward with a particular degree of force; the line in which it moves will go round the point, but it will not be a circle; it will be an oval or ellipse; the curve described by means of a cord fixed at both ends, in the way we have already explained; the point of attraction will be nearer one end of the ellipse than the other, and the time the body will take to go round, compared with the time any other body would take, moving at a different distance from the same point of attraction, but drawn towards that point with a force which bears the same proportion to the distance, will bear a certain proportion, discovered by mathematicians, to the average distances of the two bodies from the point of common attraction. If you multiply the numbers expressing the times of going round each by itself, the products will be to one another in the proportion of the average distances multiplied each by itself, and that product again by the distance. Thus, if one body take two hours, and is five yards distant, the other, being ten yards off, will take something less than five hours and forty minutes.

Now, this is one of the most important truths in the whole compass of science; for it does so happen, that the force with which bodies fall towards the earth, or what is called their *gravity*, the power that draws or attracts them towards the earth, varies with the distance exactly in

the proportion of the squares, lessening as the distance increases: at two miles from the earth, it is four times less than at one mile; at three miles, nine times less; and so forth. It goes on lessening, but never is destroyed, even at the greatest distances to which we can reach, and there can be no doubt of its extending indefinitely beyond. But, by astronomical observations made upon the motion of the heavenly bodies, upon that of the moon for instance, it is proved that her movement is slower and quicker at different parts of her course, in the same manner as a body's motion on the earth would be slower and quicker, according to its distance from the point it was drawn towards, provided it was drawn by a force acting in the proportion to the squares of the distance, which we have frequently mentioned; and the proportion of the time to the distance is also observed to agree with the rule we have referred to. Therefore, she is shown to be attracted towards the earth by a force that varies according to the same proportion in which gravity varies; and she must consequently move in an ellipse round the earth, which is placed in a point nearer the one end than the other of that curve. In like manner, it is shown that the earth moves round the sun in the same curve line, and is drawn towards the sun by the same force; and that all the other planets in their courses, at various distances, follow the same rule, moving in ellipses, and drawn towards the sun by the same kind of power. Three of them have moons like the earth, only more numerous, for Jupiter has four, Saturn seven, and Herschel six, so very distant that we cannot see them without the help of glasses; but all those moons move round their principal planets, as ours does round the earth, in ovals or ellipses; while the planets, with their moons, move in their ovals round the sun, like our own earth with its moon. But this power, which draws them all towards the sun, and regulates their path and their motion round him, and which draws the moons towards the principal planets, and regulates their motion and path round those planets, is the same with the gravity by which bodies fall towards the earth, being attracted by it. Therefore, the whole of the heavenly bodies are kept in their places, and wheel round the sun, by the same influence or power that makes a stone fall to the ground.

It is usual to call the sun, and the planets which with their moons move round him, (twelve in number, including the four lately discovered, and the one discovered by Herschel,) the *Solar System*, because they are a class of the heavenly bodies far apart from the innumerable fixed stars, and so near each other as to exert a perceptible influence on one another, and thus to be connected together. The *Comets* belong to the same system, according to this manner of viewing the subject. They are bodies which move in elliptical paths, but far longer and narrower than the curves in which the earth, and the other planets and their moons roll. Our curves are not much less round than circles; the paths of the comets are long and narrow, so as, in many places, to be more nearly straight lines than circles. They differ from the planets and their moons in another respect; they do not depend on the sun for the light they give, as our moon plainly does, being dark when the earth comes between her and the sun; and as the other planets do, those of them that are nearer the sun than we are, being dark when they come

between us and him. But the comets give light always of themselves, being apparently vast bodies heated red-hot by coming in their course far nearer the sun than the nearest of the planets ever do. Their motion is much more rapid than that of the planets: they both approach the sun much nearer, retreat from him to much greater distances, and take much longer time in going round him than any of the planets do. Yet even these comets are subject to the same great law of gravitation, which regulates the motions of the planets. Their year, the time they take to revolve, is in some cases 75, in others 135, in others 300 of our years; their distance is a hundred times our distance when furthest off, and not a hundred and sixtieth of our distance when nearest the sun; their swiftest motion is above twelve times swifter than ours, although ours is a hundred and forty times swifter than a cannon ball's; yet their path is a curve of the same kind with ours, though longer and flatter, differing in its formation only as one oval differs from another by the string you draw it with having the ends fixed at two points more distant from each other; consequently the sun, being in one of those points, is much nearer the end of the path the comet moves in, than he is near the end of our path. The motion, too, follows the same rule, being swifter the nearer the sun; the attraction of the sun varies according to the squares of the distances, being four times less at twice the distance, nine times less at thrice, and so on; and the proportion between the times of revolving and the distances is exactly the same, in the case of those remote bodies, as in that of the moon and the earth. One law prevails over all, and regulates their motions as well as our own: it is the gravity of the comets towards the sun, and they, like our own earth and moon, wheel round him in boundless space, drawn by the same force, acting by the same rule, which makes a stone fall when dropped from the hand.

The more full and accurate our observations are upon these heavenly bodies, the better we find all their motions agreeing with this great doctrine; although, no doubt, many things are to be taken into the account beside the force that draws them to their different centres: thus, while the moon is drawn by the earth, and the earth by the sun, the moon is also drawn directly by the sun; and while Jupiter is drawn by the sun, so are his moons; and both Jupiter and his moons are drawn by Saturn: nay, as this power of gravitation is quite universal, and as no body can attract or draw another without being itself drawn by that other, the earth is drawn by the moon, while the moon is drawn by the earth; and the sun is attracted by the planets which he draws towards himself. These mutual attractions give rise to many deviations from the simple line of the ellipse, and produce many irregularities in the simple calculation of the times and motions of the bodies that compose the system of the universe. But the extraordinary powers of investigation applied to the subject by the modern improvements in Mathematics, have enabled us at length to reduce even the greatest of the irregularities to order and system; and to unfold one of the most wonderful truths in all science, namely, that by certain necessary consequences of the simple fact upon which the whole fabric rests,—the proportion of the attractive force to the distances at which it operates,—all the irregularities which at first seemed to

disturb the order of the system, and to make the appearances depart from the doctrine, are themselves subject to a certain fixed rule, and can never go beyond a particular point, but must begin to lessen when they have slowly reached that point, and then lessen until they reach another point, when they begin again to increase; and so on, for ever. Thus, the planets move in ovals, from gravity, the power that attracts them, towards the sun, combined with the original impulse they received forwards; and the disturbing forces are continually varying the course of the curves or ovals, making them bulge out in the middle, as it were, on the sides, though in a very small proportion to the whole length of the ellipse. The oval thus bulging, however, its length never alters, only its breadth, and that breadth increases by a very small quantity yearly and daily; after a certain number of years it becomes as great as it ever can be; then the alteration takes a contrary direction, and the curve gradually flattens as it had bulged; till, in the same number of years which it took to bulge, it becomes as flat as it ever can be, and then it begins to bulge again, and so on for ever; and so of every other disturbance and irregularity in the system. What at first appears to be some departure from the rule, when more fully examined, turns out to be only a consequence of it, or a result of a more general arrangement springing from the principle of gravitation; an arrangement of which the rule itself, and the apparent or supposed exception, form parts.

The power of gravitation, which thus regulates the whole system of the universe, is found to rule each member or branch of it separately. Thus, it is demonstrated, that the tides of the ocean are caused by the gravitation which attracts the water towards the sun and moon; and the figure both of our earth and of such of the other bodies as have a spinning motion round their axis, is determined by gravitation; they are all flattened towards the ends of the axis they spin upon, and bulge out towards the middle.

The great discoverer of the principle on which all these truths rest, Sir Isaac Newton, certainly by far the most extraordinary man that ever lived, concluded by reasoning upon the nature of motion and matter that this flattening must take place in our globe: every one before his time had believed the earth to be a perfect sphere or globe, chiefly from observing the round shadow which it casts on the moon in eclipses; and it was many years after his death that the accuracy of his opinion was proved by measurements on the earth's surface, and by the different weight and attraction of bodies at the equator, where it bulges, and at the poles, where it is flattened. The improved telescopes have enabled us to ascertain the same fact with respect to the planets Jupiter and Saturn.

Beside unfolding the general laws which regulate the motions and figures of the heavenly bodies forming our solar system, Astronomy consists in calculations of the places, times, and eclipses of those bodies, and their moons or *satellites*, (from a Latin word, signifying an *attendant*;) and in observations of the fixed stars, which are innumerable assemblages of bodies, not moving round the sun as our earth and the other planets do, nor receiving the light they shine with from his light; but shining, as the sun and the comets do, with a light of

their own; and placed, to all appearance, immovable, at immense distances from our world, that is, from our solar system. Each of them is probably the sun of some other system like our own, composed of planets and their moons, or satellites; but so extremely far off from us, that they all are seen by us like one point of faint light, as you see two lamps, placed a few inches asunder, only like one, when you view them a great way off. The numbers of the fixed stars are prodigious; even to the naked eye they are very numerous, about 3000 being thus visible; but when the heavens are viewed through the telescope, stars become visible in numbers wholly incalculable: 2000 are discovered in one of the small collections of a few visible stars called *Constellations*; nay, what appears to the naked eye only a light cloud, as the *Milky Way*, when viewed through a telescope, proves to be an assemblage of innumerable fixed stars, each of them in all likelihood a sun and a system like the rest, though at an immeasurable distance from ours.

The size, and motions, and distances of the heavenly bodies are such as to exceed the power of ordinary imagination, from any comparison with the smaller things we see around us. The earth's diameter is nearly 8000 miles in length; but the sun's is above 880,000 miles, and the bulk of the sun is above 1,300,000 times greater than that of the earth. The planet Jupiter, which looks like a mere speck, from his vast distance, is nearly 1300 times larger than the earth. Our distance from the sun is above 95 millions of miles; but Jupiter is 490 millions, and Saturn 900 millions of miles distant from the sun. The rate at which the earth moves round the sun is 68,000 miles an hour, or 140 times swifter than the motion of a cannon-ball; and the planet Mercury, the nearest to the sun, moves still quicker, nearly 110,000 miles an hour. We, upon the earth's surface, beside being carried round the sun, move round the earth's axis by the rotatory or spinning motion which it has; so that every 24 hours we move in this manner near 14,000 miles, beside moving round the sun above 1,600,000 miles. These motions and distances, however, prodigious as they are, seem nothing compared to those of the comets, one of which, when furthest from the sun, is 11,200 millions of miles from him; and when nearest the sun, flies at the amazing rate of 880,000 miles an hour. Sir I. Newton calculated its heat at 2000 times that of red-hot iron; and that it would take millions of years to cool. But the distance of the fixed stars is yet more vast: they have been supposed to be 400,000 times further from us than we are from the sun, that is 38 millions of millions of miles: so that a cannon-ball would take between four and five millions of years to reach one of them, supposing there was nothing to hinder it from pursuing its course thither.

Astronomers have, by means of their excellent glasses, aided by Geometry and calculation, been able to observe not only stars, planets, and their satellites, invisible to the naked eye, but to measure the height of mountains in the moon by observations of the shadows which these eminences cast on her surface; and they have discovered volcanoes, or burning mountains, on the same body.

The tables which they have by the same means been enabled to form of the heavenly motions, are of great use in navigation. By means of the eclipses of Jupiter's satellites, and by the tables of the moon's

motion, we can ascertain the position of a ship at sea; for the observation of the sun's height at mid-day gives the *latitude* of the place, that is, its distance from the equinoctial or equator, the line passing through the middle of the earth's surface; and these tables, with the observations of the satellites, or moons, give the distance east and west of the observatory for which the tables are calculated; what is called the *longitude* of the place: consequently the mariner can thus tell nearly in what part of the ocean he is, how far he has sailed from his port of departure, and how far he must sail, and in what direction, to gain the port of his destination. The advantage of this knowledge is therefore manifest in the common affairs of life; but it sinks into insignificance compared with the vast extent of those views which the contemplations of the science afford, of numberless worlds filling the immensity of space, and all kept in their places, and adjusted in their prodigious motions by the same simple principle, under the guidance of an all-wise and all-powerful Creator.

We have been considering the application of Dynamics to the motions of the heavenly bodies, which forms the science of *Physical Astronomy*. The application of Dynamics to the calculation, production, and direction of motion, forms the science of *Mechanics*, sometimes called *Practical Mechanics*, to distinguish it from the more general use of the word, which comprehends every thing that relates to motion and force. The fundamental principle of the science upon which it mainly depends, flows immediately from a property of the circle already mentioned, and which, perhaps, appeared at the moment of little value, that the lengths of circles are in proportion to their diameters. Observe how, upon this simple truth, nearly the whole of those contrivances are built by which the power of man is increased, as far as solid matter assists him in extending it; and nearly the whole of those doctrines, too, by which he is enabled to explain the voluntary motions of animals, as far as those depend upon their own bodies. There can be nothing more instructive in showing the importance and fruitfulness of scientific truths, however trivial and forbidding they may at first sight appear. For it is an immediate consequence of this property of the circle, that if a rod of iron, or beam of wood, or any other such solid material, be placed on a point or pivot, so that it may move as the arms of a balance do round its centre, or a see-saw board does round its prop, the two ends will go through parts of circles, each proportioned to that arm of the beam to which it belongs; the two circles will be equal if the pivot is in the centre or middle point of the beam; but if it is nearer one end than the other, say three times, that end will go through a circular space, or arch, three times shorter than the circular space the other end goes through in the same time. If, then, the end of the long beam goes through three times the space, it must move with three times the swiftness of the short beam's end, since both move in the same time; and therefore any force applied to the long end must overcome the resistance of three times that force applied at the opposite end, since the two ends move in contrary directions; hence one pound placed at the long end would balance three placed at the short end. The beam we have been supposing is called a *Lever*, and the same

rule must evidently hold for all proportions of the lengths of its beams. If, then, the lever be 17 feet long, and the pivot, or *fulcrum*, (as it is called, from a Latin word signifying *support*,) be a foot from one end, an ounce placed on the other end will balance a pound placed on the near end; and the least additional weight, or the slightest push or pressure on the far end, so loaded, will make the pound weight on the other move upwards. If, instead of an ounce, we place upon the long end the short end of a second beam or lever supported by a fulcrum, one foot from it, and then place the long end of this second lever upon the short end of a third lever, whose fulcrum is one foot from it; and if we put on the end of this third lever's long arm an ounce weight, that ounce will move upwards a pound on the second lever's long arm, and this moving upwards will cause the short arm to force downwards 16 pounds at the long end of the first lever, which will make the short end of the first lever move upwards, though 256 pounds be laid on it; the same thing continuing, a pound on the long end of the third lever will move a ton and three quarters at the short end of the first lever; that is, will balance it so that the slightest touch or pressure with the finger, or a touch from a child's hand will move as much as two horses can draw. The Lever is called on this account a *mechanical power*; and there are five other mechanical powers of which its properties form the foundation; indeed they may be resolved into combinations of levers. Thus the wheel and axle is only a lever moving round an axle, and always retaining the effect gained during every part of the motion, by means of a rope wound round the butt end of the axle; the spoke of the wheel being the long arm of the lever, and the half diameter of the axle its short arm. By a combination of levers, wheels, pullies, so great an increase of force is obtained, that, but for the obstruction from friction, and the resistance of the air, there could be no bounds to the effect of the smallest force thus multiplied; and to this fundamental principle, Archimedes, one of the most illustrious mathematicians of ancient times, referred, when he boasted, that if he only had a pivot or fulcrum whereon he might rest his machinery, he could move the earth. Upon so simple a truth, assisted by the aid derived from other means, rests the whole fabric of mechanical power, whether for raising weights, or cleaving rocks, or pumping up rivers from the bowels of the earth; or, in short, performing any of those works to which human strength, even augmented by the help of the animals whom Providence has subdued to our use, would prove altogether inadequate.

The application of Dynamics to the pressure and motions of fluids, constitutes a science which receives different appellations according as the fluids are heavy and liquid like water, or light and invisible like air. In the former case it is called *Hydrodynamics*, from the Greek words signifying *water* and *power*, or *force*; in the latter *Pneumatics*, from the Greek word signifying *breath* or *air*; and Hydrodynamics is divided into *Hydrostatics*, which treats of the weight and pressure of liquids, from the Greek words for *balancing* of *water*, and *Hydraulics*, which treat of their motion, from the Greek name for certain musical instruments played with *water* in *pipes*.

The discoveries to which experiments, aided by mathematical reason-

ing, have led, upon the pressure and motion of fluids, are of the greatest importance, whether we regard their application to practical purposes, or to the explanation of the appearances in nature, or their singularity as the subjects of scientific contemplation. When it is found that the pressure of water upon any surface that contains it, is not in the least degree proportioned to its bulk, but only to the height at which it stands, so that a long small pipe-full, containing a pound or two of water, will give the pressure of twenty or thirty ton; nay, of twice or thrice as much, if its length be increased, and its bore lessened, without the least regard to the quantity of the liquid: we are not only astonished with so extraordinary and unexpected a property of matter, but we at once perceive one of the great agents employed in the vast operations of nature, in which the most trifling means are used to work the mightiest effects. We likewise learn to guard against many serious mischiefs in our own works, and to apply safely and usefully a power calculated, according as it is directed, either to produce unbounded devastation, or to render the most beneficial service.

Nor are the discoveries relating to the Air less interesting in themselves, and less applicable to important uses. It is an agent, though invisible, as powerful as water, both in the operations of nature and of art. Experiments of a simple and decisive nature show the amount of its pressure to be between 14 and 15 pounds on every square inch; but, like all other fluids, it presses equally in every direction; so that, though on our hand there is a pressure downwards of above 250 pounds, yet this is exactly balanced by an equal pressure upwards, from the air pressing round and getting below. If, however, the air be removed below, the whole pressure from above acts unbalanced: hence the ascent of water in pumps, which suck out the air from a barrel, and allow the pressure upon the water to force it up 32 or 33 feet, that body of water being equal to the weight of the atmosphere; hence the ascent of the mercury in the barometer but only 28 or 29 inches, mercury being between 13 and 14 times heavier than water. Hence, too, the motion of the steam-engine; the piston of which is pressed downwards by the weight of the atmosphere from above, all air being removed below it by first filling it with steam, and then suddenly cooling and converting that steam into water. Hence, too, the power which some animals possess of walking along the perpendicular surfaces of walls, and even the ceilings of rooms, by squeezing out the air between the inside of their feet and the surface of the wall, and thus being supported by the pressure of the air against the outside of their feet.

The science of *Optics*, (from the Greek word for *seeing*,) which teaches the nature of light, and of the sensation conveyed by it, presents, of itself, a field of unbounded extent and interest. To it the arts, and the other sciences, owe those most useful instruments which have enabled us at once to examine the minutest parts of the structure of animal and vegetable bodies, and to calculate the size and the motions of the most remote of the heavenly bodies. But as an object of learned curiosity, nothing can be more singular than the fundamental truth discovered by the genius of Newton,—that the light, which we call white, is in fact composed of all the colours, blended in certain proportions; unless, perhaps, it be that astonishing conjecture of his

unrivalled sagacity, by which he descried the inflammable nature of the diamond, and its belonging, against all appearance of probability, to the class of oily substances, by observing that it stood among them, and far removed from all crystals, in the degree of its action upon light; a conjecture turned into certainty by discoveries made a century afterwards.

To a man who, for original genius and strong natural sense, is not unworthy of being named after this illustrious sage, we owe the greater part of *Electrical* science. It treats of the peculiar substance, resembling both light and heat, which, by rubbing, is found to be produced in a certain class of bodies, as glass, wax, silk, amber; and to be conveyed easily or *conducted* through others, as wood, metals, water; and it has received the name of *Electricity* from the Greek word for *amber*. Dr. Franklin discovered that this is the same matter which, when collected in the clouds, and conveyed from them to the earth, we call *lightning*, and whose noise, in darting through the air, is *thunder*. The observation of some movements in the limbs of a dead frog gave rise to the discovery of *Animal Electricity* or *Galvanism*, as it was at first called from the name of the discoverer; and which has of late years given birth to improvements that have changed the face of chemical philosophy; affording a new proof how few there are of the processes of nature, incapable of repaying our labour, bestowed in patiently and diligently examining them. It is to the results of the remark accidentally made upon the twitching in the frog's leg, not, however, hastily dismissed and forgotten, but treasured up and pursued through many an elaborate experiment and calculation, that we owe our acquaintance with the extraordinary metal, liquid like mercury, lighter than water, and more inflammable than phosphorus, which forms when it burns, by mere exposure to the air, one of the salts best known in commerce, and the principal ingredient in saltpetre.

In order to explain the nature and objects of those branches of Natural Science more or less connected with the mathematics, some details were necessary, as without them it was difficult at once to perceive their importance, and, as it were, relish the kind of instruction which they afford. But the same course needs not be pursued with respect to the other branches. The value and the interest of Chemistry is at once perceived, when it is known to teach the nature of all substances, the relations of simple substances to heat and to one another, or their combinations together; the composition of those which nature produces in a compound state, and the application of the whole to the arts and manufactures. Some branches of philosophy, again, are chiefly useful and interesting to particular classes, as surgeons and physicians. Others are easily understood by a knowledge of the principles of Mechanics and Chemistry, of which they are applications and examples; as those which teach the structure of the earth and the changes it has undergone; the motions of the muscles, and the structure of the parts of animals; the qualities of animal and vegetable substances; and that department of Agriculture which treats of soils, manure, and machinery. Other branches are only collections of facts, highly curious and useful indeed, but which any one who reads or listens, perceives as clearly, and comprehends as readily, as the professed student. To this class

belongs Natural History, in so far as it describes the habits of animals and plants, and its application to that department of Agriculture which treats of cattle and their management.

IV. But, for the purpose of further illustrating the advantages of Philosophy, its tendency to enlarge the mind, as well as to interest it agreeably, and afford pure and solid gratification, a few instances may be given of the singular truths brought to light by the application of mathematical, mechanical, and chemical knowledge to the habits of animals and plants; and some examples may be added of the more ordinary and easy, but scarcely less interesting observations, made upon those habits, without the aid of the profounder sciences.

We may remember the curve line which mathematicians call a cycloid. It is the path which any point of a circle, moving along a plane, and round its centre, traces in the air; so that the nail on the felly of a cart-wheel moves in a cycloid, as the cart goes along, and as the wheel itself both turns round its axle, and is carried along the ground. Now this curve has certain properties of a peculiar and very singular kind with respect to motion. One is, that if any body whatever moves in a cycloid by its own weight or swing, together with some other force acting upon it, it will go through all distances of the same curve in exactly the same time; and, accordingly, pendulums are contrived to swing in such a manner, that they shall describe cycloids, or curves very near cycloids, and thus move in equal times, whether they go through a long or a short part of the same curve. Again, if a body is to descend from any one point to any other, not in the perpendicular, by means of some force acting on it together with its weight, the line in which it will go the quickest of all will be the cycloid, not the straight line, though that is the shortest of all lines which can be drawn between the two points; nor any other curve whatever, though many are much flatter, and therefore shorter than the cycloid—but the cycloid, which is longer than them, is yet of all curves or straight lines which can be drawn, the one the body will move through in the shortest time. Suppose the body is to move from one point to another, by its weight and some other force acting together, but to go through a certain space, as a hundred yards, the way it must take to do this in the shortest time possible, is by moving in a cycloid; or the length of a hundred yards must be drawn into a cycloid, and then the body will descend through the hundred yards in a shorter time than it could go the same distance in any other path whatever. Now, it is believed that birds which build in the rocks, drop or fly down from height to height in this course. It is impossible to make very accurate observations on their flight and path; but there is a general resemblance certainly between the course they take and the cycloid, which has led ingenious men to adopt this opinion.

If we have a certain quantity of any substance, a pound of wood, for example, and would fashion it in the shape to take the least room, we must make a globe of it; it will in this figure have the smallest surface. But suppose we want to form the pound of wood, so that in moving through the air or water it shall meet with the least possible resistance, then we must lengthen it out for ever, till it becomes not only like a

long-pointed pin, but thinner and thinner, longer and longer, till it is quite a straight line, and has no perceptible breadth or thickness at all. If we would dispose of the given quantity of matter so that it shall have a certain length only, say a foot, and a certain breadth at the thickest part, say three inches, and move through the air or water with the smallest possible resistance which a body of those dimensions can meet, then we must form it into a figure of a peculiar kind, called the *Solid of least resistance*, because of all the shapes that can be given to the body, its length and breadth remaining the same, this is the one which will make it move with the least resistance through the air, or water, or other fluid. A very difficult chain of mathematical reasoning, by means of the highest branches of algebra, leads to a knowledge of the curve, which by revolving on its axis makes a solid of this shape, in the same way that a circle by so revolving makes a sphere or globe; and the curve certainly resembles closely the face or head part of a fish. Nature, therefore, (by which we always mean the Divine Author of nature,) has fashioned these fishes so, that, according to mathematical principles, they swim the most easily through the element they live and move in.

Suppose upon the face part of one of these fishes a small insect were bred, endowed with faculties sufficient to reason upon its condition, and upon the motion of the fish it belonged to, but never to have discovered the whole size and shape of the face part, it would certainly complain of the form as clumsy, and fancy that it could have made the fish so as to move with less resistance. Yet if the whole shape were disclosed to it, and it could discover the principle on which that shape was preferred, it would at once perceive, not only that what had seemed clumsy was skilfully contrived, but that if any other shape whatever had been taken, there would have been an error committed; nay, *that there must of necessity* have been an error; and that the very best possible arrangement had been adopted. So it may be with man in the Universe, where, seeing only a part of the great system, he fancies there is evil; and yet, if he were permitted to survey the whole, what had seemed imperfect might appear to be necessary for the general perfection, insomuch that any other arrangement, even of that seemingly imperfect part, must needs have rendered the whole less perfect. The common objection is, that what seems evil might have been avoided; but in the case of the fish's shape it *could not* have been avoided.

It is found by optical inquiries, that the rays or particles of light, in passing through transparent substances of a certain form, are bent to a point where they make an image or picture of the shining bodies they come from, or of the dark bodies they are reflected from. Thus, if a pair of spectacles be held between a candle and the wall, they make two images of the candle upon it; and if they be held between the window and a sheet of paper when the sun is shining, they will make a picture on the paper of the houses, trees, fields, sky, and clouds. The eye is found to be composed of several natural magnifiers which make a picture on a membrane at the back of it, and from this membrane there goes a nerve to the brain, conveying the impression of the picture, by means of which we see it. Now, white light was discovered by Newton to consist of different-coloured parts, which are differently bent in passing through transparent substances, so that the lights of different

colours come to a point at different distances, and thus create an indistinct image. This was long found to make our telescopes imperfect, insomuch that it became necessary to make them of reflectors or mirrors; and not of magnifying glasses—the same difference not being observed to affect their reflection. But another discovery was about fifty years afterwards made by Mr. Dollond, that by combining different kinds of glass in a compound magnifier, the difference may be greatly corrected; and on this principle he constructed his telescopes. It is found, too, that the different natural magnifiers of the eye are combined upon a principle of the same kind. Thirty years later, a third discovery was made by Mr. Blair, of the greatly superior effect which combinations of different liquids have in correcting the imperfection; and, most wonderful to think, when the eye is examined, we find it consists of different liquids, acting naturally upon the same principle which was thus recently found out in Optics by many ingenious mechanical and chemical experiments.

Again, the point to which any magnifier collects the light is more or less distant as the magnifier is smaller or rounder, so that a small globe of glass or any transparent substances makes a microscope. And this property of light depends upon the nature of lines, and is purely of a mathematical nature, after we have once ascertained by experiment, that light is bent in a certain way when it passes through transparent bodies. Now birds flying in the air, and meeting with many obstacles, as branches and leaves of trees, require to have their eyes sometimes as flat as possible for protection; but sometimes as round as possible, that they may see the small objects, flies and other insects, which they are chasing through the air, and which they pursue with the most unerring certainty. This could only be accomplished by giving them a power of suddenly changing the form of their eyes. Accordingly, there is a set of hard scales placed on the outer coat of their eye, round the place where the light enters; and over these scales are drawn the muscles or fibres by which motion is communicated; so that, by acting with these muscles, the bird can press the scales, and squeeze the natural magnifier of the eye into a round shape when it wishes to follow an insect through the air, and can relax the scales, in order to flatten the eye again when it would see a distant object, or move safely through leaves and twigs. This power of altering the shape of the eye is possessed by birds of prey in a very remarkable degree. They can see the smallest objects close to them, and can yet discern larger bodies at vast distances, as a carcass stretched upon the plain, or a dying fish afloat on the water.

A singular provision is made for keeping the surface of the bird's eye clean, for wiping the glass of the instrument, as it were, and also for protecting it, while rapidly flying through the air and through thickets, without hindering the sight. Birds are, for these purposes, furnished with a third eyelid, a fine membrane or skin, which is constantly moved very rapidly over the eyeball by two muscles placed in the back of the eye. One of the muscles ends in a loop, the other in a string which goes through the loop, and is fixed in the corner of the membrane, to pull it backward and forward. If you wish to draw a thing towards any place with the least force, you must pull directly in the line between

the thing and the place; but if you wish to draw it as quickly as possible, and do not regard the loss of force, you must pull it obliquely, by drawing it in two directions at once. Tie a string to a stone, and draw it straight towards you with one hand; then, make a loop on another string, and running the first through it, draw one string in each hand, not towards you, but side-ways, till both strings are stretched in a straight line: you will see how much swifter the stone moves than it did before when pulled straight forward. Now this is proved, by mathematical reasoning, to be the necessary consequence of forces applied obliquely: there is a loss of power, but a great increase of velocity. The velocity is the thing required to be gained in the third eyelid, and the contrivance is exactly that of a string and a loop, moved each by a muscle, as the two strings are by the hands in the case we have been supposing.

A third eyelid of the same kind is found in the horse, and called the *haw;* it is moistened with a pulpy substance (or mucilage) to take hold of the dust on the eyeball, and wipe it clean off, so that the eye is hardly ever seen with any thing upon it, though greatly exposed from its size and posture. The swift motion of the haw is given to it by a gristly, elastic substance, placed between the eyeball and the socket, and striking obliquely, so as to drive out the haw with great velocity over the eye, and then let it come back as quickly. Ignorant persons when this haw is inflamed from cold and swells so as to appear, which it never does in a healthy state, often mistake it for an imperfection, and cut it off! So nearly does ignorance produce the same mischief as cruelty! They might as well cut off the pupil of the eye, taking it for a black spot.

If any quantity of matter, as a pound of wood or iron, is fashioned into a rod of a certain length, say one foot, the rod will be strong in proportion to its thickness; and, if the figure is the same, that thickness can only be increased by making it hollow. Therefore, hollow rods or tubes, of the same length and quantity of matter, have more strength than solid ones. This is a principle so well understood now, that engineers make their axles and other parts of machinery hollow, and therefore stronger with the same weight, than they would be if thinner and solid. Now the bones of animals are all more or less hollow; and are therefore stronger with the same weight and quantity of matter than they otherwise would be. But birds have the largest bones in proportion to their weight; their bones are more hollow than those of animals which do not fly; and therefore they have strength without having to carry more weight than is absolutely necessary. Their quills derive strength from the same construction. They have another peculiarity to help their flight. No other animals have any communication between the air-vessels of their lungs and the hollow parts of their bodies; but birds have; and by this means they can blow out their bodies as we do a bladder, and thus make themselves lighter when they would either make their flight towards the ground slower, or rise more swiftly, or float more easily in the air. Fishes possess a power of the same kind, though not by the same means. They have air-bladders in their bodies, and can puff them out, or press them closer, at pleasure: when they want to rise in the water, they fill out the bladder, and this lightens

them. If the bladder breaks, the fish remains at the bottom, and can only be held up by the most laborious exertions of the fins and tail. Accordingly, flat fish, as skaits and flounders, which have no air-bladders, seldom rise from the bottom, but are found lying on banks in the sea, or at the bottom of sea rivers.

If you have a certain space, as a room, to build up with closets or little cells, all of the same size and shape, there are only three figures which will answer, and enable you to fill the room without losing any space between the cells; they must either be squares, or figures of three equal sides, or figures of six equal sides. With any other figures whatever, space would be lost between the cells. This is evidently true upon considering the matter; and it is proved by mathematical reasoning. The six-sided figure is by far the most convenient of these three shapes, because its corners are flatter, and any round body placed in it has therefore more space, there being less room lost in the corners. Likewise, this figure is the strongest of the three; any pressure either from without or from within will hurt it less, as it has something of the strength of an arch. A round figure would be still stronger, but then room would be lost between the circles, whereas none at all is lost with the six-sided figure. Now, it is a most remarkable fact, that *Bees* build their cells exactly in this shape, and thereby save both room and materials beyond what they could save if they built in any other shape whatever. They build in the very best possible shape for their purpose, which is to save all the room and all the wax they can. So far as to the shape of the walls of each cell; but the roof and floor, or top and bottom, are built on equally true principles. It is proved by mathematicians, that to give the greatest strength and save the most room, the roof and floor must be made of three square planes meeting in a point; and they have further proved by a demonstration belonging to the highest parts of Algebra, that there is one particular angle or inclination of those planes to each other where they meet, which makes a greater saving of materials and of work than any other inclination whatever could possibly do. Now, the bees actually make the tops and bottoms of their cells of three planes meeting in a point, and the inclination or angle at which they meet is precisely the one found out by the mathematicians to be the best possible for saving wax and work. Who would dream for an instant of the bee knowing the highest branches of Mathematics—the fruits of Newton's most wonderful discovery—a result, too, of which he was himself ignorant, one of his most celebrated followers having found it out? This little insect works with a truth and correctness which are quite perfect, and according to the principles at which man has only arrived, after ages of slow improvement in the most difficult branch of the most difficult science. But the mighty and all wise Creator, who made the insect and the philosopher, bestowing reason on the latter, and giving the former to work without it—to Him all truths are known from all eternity, with an intuition that mocks even the conceptions of the sagest of human kind.

It may be recollected, that when the air is exhausted or sucked out of any vessel, there is no longer the force necessary to resist the pressure of the air on the outside; and the sides of the vessel are therefore pressed inwards with violence: a flat glass would thus be broken, unless

it were very thick; a round one, having the strength of an arch, would resist better; but any soft substance, as leather or skin, would be crushed or squeezed together at once. If the air was only sucked out slowly, the squeezing would be gradual, or, if it were only half sucked out, the skin would only be partly squeezed together. This is the very process by which *Bees* reach the fine dust and juices of hollow flowers, like the honeysuckle, and some kinds of long fox-glove, which are too narrow for them to enter. They fill up the mouth of the flower with their bodies, and suck out the air, or at least a large part of it; this makes the soft sides of the flower close, and squeezes the dust and juice towards the insect as well as a hand could do, if applied to the outside.

We may remember this pressure or weight of the atmosphere as shown by the barometer, the sucking-pump, and the air-pump. Its weight is near 15 pounds on every square inch, so that if we could entirely squeeze out the air between our two hands, they would cling together with a force equal to the pressure of double this weight, because the air would press upon both hands; and if we could contrive to suck or squeeze out the air between one hand and the wall, the hand would stick fast to the wall, being pressed on it with the weight of above two hundred weight, that is, near 15 pounds on every square inch of the hand. Now, by a late most curious discovery of Sir Everard Home, the distinguished anatomist, it is found that this is the very process by which *Flies* and other insects of a similar description are enabled to walk up perpendicular surfaces, however smooth, as the sides of walls and panes of glass in windows, and to walk as easily along the ceiling of a room with their bodies downwards and their feet over head. Their feet, when examined by a microscope, are found to have flat skins or flaps, like the feet of web-footed animals, as ducks and geese; and they have towards the back part or heel, but inside the skin or flap, two very small toes so connected with the flap as to draw it close down upon the glass or wall the fly walks on, and to squeeze out the air completely, so that there is a vacuum made between the foot and the glass or wall. The consequence of this is, that the air presses the foot on the wall with a very considerable force compared to the weight of the fly; for if its feet are to its body in the same proportion as ours are to our bodies, since we could support by a single hand on the ceiling of the room (provided it made a vacuum) more than our whole weight, namely, a weight of fifteen stone, the fly can easily move on four feet in the same manner by help of the vacuum made under its feet. It has likewise been found that some of the larger sea animals are by the same construction, only upon a greater scale, enabled to climb the perpendicular and smooth surfaces of the ice hills among which they live. Some kinds of lizard have the same power of climbing, and of creeping with their bodies downwards along the ceiling of a room; and the means by which they are enabled to do so are the same. In the large feet of these animals, the contrivance is easily observed, of the two toes or tightners, by which the skin of the foot is pinned down, and the air excluded in the act of walking or climbing; but it is the very same, only upon a larger scale, with the mechanism of a fly's or a butterfly's foot; and both operations, the climbing of the sea-horse on the ice, and the creeping of the fly on the

window or the ceiling, are performed exactly by the same power, the weight of the atmosphere, which causes the quicksilver to stand in the weather-glass, the wind to whistle through a key-hole, and the piston to descend in a steam-engine.

Although philosophers are not agreed as to the peculiar action which light exerts upon vegetation, and there is even some doubt respecting the decomposition of air and water during that process, one thing is undeniable, the necessity of light to the growth and health of plants; and accordingly they are for the most part so formed as to receive it at all times when it shines on them. Their cups, and the little assemblages of their leaves before they sprout, are found to be more or less affected by the light, so as to open and receive it. In several kinds of plants this is more evident than in others; their flowers close entirely at night, and open in the day. Some, as the Sunflower, and a tribe of the like description, constantly turn round towards the light, following the sun, as it were, while he makes or seems to make his revolution, so that they receive the greatest quantity possible of his rays. Plants of this kind require more light than others for their growth, and this is the provision made for supplying them.

The lightness of inflammable gas is well known. When bladders, of any size, are filled with it, they rise upwards, and float in the air. Now, it is a most curious fact, that the fine dust, by means of which plants are impregnated one by the other, is composed of very small globules, filled with this gas—in a word, of small air balloons. These globules thus float from the male plant through the air, and striking against the females, are detained by a glue prepared on purpose to stop them, which no sooner moistens the globules than they explode, and their substance remains, the gas flying off which enabled them to float. A provision of a very simple kind is also made to prevent the male and female blossoms of the same plant from breeding together, this being found to hurt the breed of vegetables, just as breeding in and in does the breed of animals. It is contrived that the dust shall be shed by the male blossom before the female is ready to be affected by it, so that the impregnation must be performed by the dust of some other plant, and in this way the breed be crossed. The light gas with which the globules are filled is most essential to this operation, as it conveys them to great distances. A plantation of yew trees has been known, in this way, to impregnate another several hundred yards off.

The contrivance by which some creeper plants are enabled to climb walls, and fix themselves, deserves attention. The *Virginia creeper* has a small tendril, ending in a claw, each toe of which has a knob, thickly set with extremely small bristles; they grow into the invisible pores of the wall, and swelling stick there as long as the plant grows, and prevent the branch from falling; but when the plant dies, they become thin again, and drop out, so that the branch falls down. The *Vanilla* plant of the West Indies climbs round trees likewise by means of tendrils; but when it has fixed itself, the tendrils drop off, and their place is supplied by leaves.

It is found by chemical experiments, that the juice which is in the stomachs of animals, (called the *gastric* juice, from a Greek word signifying *the belly*,) has very peculiar properties. Though it is for the

most part a tasteless, clear, and seemingly a very simple liquor, it nevertheless possesses extraordinary powers of dissolving substances which it touches or mixes with; and it varies in different classes of animals. In one particular it is the same in all animals: it will not attack living matter, but only dead; the consequence of which is, that its powers of eating away and dissolving are perfectly safe to the animals themselves, in whose stomachs it remains without ever hurting them. This juice differs in different animals according to the food on which they subsist: thus, in birds of prey, as kites, hawks, owls, it only acts upon animal matter, and does not dissolve vegetables. In other birds, and in all animals feeding on grass, as oxen, sheep, hares, it dissolves vegetable matter, as grass, but will not touch flesh of any kind. This has been ascertained by making them swallow balls with meat in them, and several holes drilled through, to let the gastric juice reach the meat: no effect was produced upon it. We may further observe, that there is a most curious and beautiful correspondence between this juice in the stomach of different animals and the other parts of their bodies, connected with the important operations of eating and digesting their food. The use of the juice is plainly to convert what they eat into a fluid, from which, by various other processes, all their parts, blood, bones, muscles, &c. are afterwards formed. But the food is first of all to be obtained, and then prepared by bruising, for the action of the juice. Now birds of prey have instruments, their claws and beak, for tearing and devouring their food, (that is animals of different kinds,) but those instruments are useless for picking up and crushing seeds: accordingly, they have a gastric juice which dissolves the animals they eat; while birds which have only a beak fit for pecking, drinking, and eating seeds, have a juice that dissolves seeds, and not flesh. Nay more, it is found that the seeds must be bruised before the juice will dissolve them: this you find by trying the experiment in a vessel with the juice; and accordingly the birds have a gizzard, and animals which graze have flat teeth, which grind and bruise their food before the gastric juice is to act upon it.

We have seen how wonderfully the *Bee* works, according to rules discovered by man thousands of years after the insect had followed them with perfect accuracy. The same little animal seems to be acquainted with principles of which we are still ignorant. We can, by crossing, vary the forms of cattle with astonishing nicety; but we have no means of altering the nature of an animal once born, by means of treatment and feeding. This power, however, is undeniably possessed by the bees. When the queen bee is lost, by death or otherwise, they choose a grub from among those which are born for workers; they make three cells into one, and placing the grub there, they build a tube round it; they afterwards build another cell of a pyramidal form, into which the grub grows: they feed it with peculiar food, and tend it with extreme care. It becomes, when transformed from the worm to the fly, not a worker, but a queen bee.

These singular insects resemble our own species, in one of our worst propensities, the disposition to war; but their attention to their sovereign is equally extraordinary, though of a somewhat capricious kind. In a few hours after their queen is lost, the whole hive is in a

state of confusion. A singular humming is heard, and the bees are seen moving all over the surface of the combs with great rapidity. The news spread quickly, and when the queen is restored, quiet immediately succeeds. But if another queen is put upon them, they instantly discover the trick, and, surrounding her, they either suffocate or starve her to death. This happens if the false queen is introduced within a few hours after the first is lost or removed; but if twenty-four hours have elapsed, they will receive any queen, and obey her.

The labours and the policy of the *Ants* are, when closely examined, still more wonderful, perhaps, than those of the *Bee*. Their nest is a city consisting of dwelling-places, halls, streets, and squares, into which the streets open. The food they principally like is the honey which comes from another insect found in their neighbourhood, and which they, generally speaking, bring home from day to day as they want it. Later discoveries have shown that they do not eat grain, but live almost entirely on animal food and this honey. Some kinds of ant have the foresight to bring home the insects on whose honey they feed, and keep them in particular cells, where they guard them to prevent their escaping, and feed them with proper vegetable matter which they do not eat themselves. Nay, they obtain the eggs of those insects, and superintend their hatching, and then rear the young insect until he becomes capable of supplying the desired honey. They sometimes remove them to the strongest parts of their nest, where there are cells apparently fortified for protecting them from invasion. In those cells the insects are kept to supply the wants of the whole ants which compose the population of the city. It is a most singular circumstance in the economy of nature, that the degree of cold at which the ant becomes torpid is also that at which this insect falls into the same state. It is considerably below the freezing point; so that they require food the greater part of the winter, and if the insects on which they depend for food were not kept alive during the cold in which the ants can move about, the latter would be without the means of subsistence.

How trifling soever this little animal may appear in our climate, there are few more formidable creatures than the ant of some tropical countries. A traveller who lately filled a high station in the French government, Mr. Malouet, has described one of their cities, and, were not the account confirmed by various testimonies, it might seem exaggerated. He observed at a great distance what seemed a lofty structure, and was informed by his guide that it consisted of an ant hill, which could not be approached without danger of being devoured. Its height was from 15 to 20 feet, and its base 30 or 40 feet square. Its sides inclined like the lower part of a pyramid, the point being cut off. He was informed that it became necessary to destroy these nests, by raising a sufficient force to dig a trench all round, and fill it with fagots, which were afterwards set on fire; and then battering with cannon from a distance, to drive the insects out and make them run into the flames. This was in South America; and African travellers have met with them in the same formidable numbers and strength.

The older writers of books upon the habits of some animals abound

with stories which may be of doubtful credit. But the facts now stated respecting the Ant and Bee, may be relied on as authentic. They are the result of very late observations, and experiments made with great accuracy by several most worthy and intelligent men, and the greater part of them have the confirmation arising from more than one observer having assisted in the inquiries. The habits of *Beavers* are equally well authenticated, and, being more easily observed, are vouched by a greater number of witnesses. These animals, as if to enable them to live and move either on land or water, have two web feet like those of ducks or water dogs, and two like those of land animals. When they wish to construct a dwelling-place, or rather city, for it serves the whole body, they choose a level place with a stream running through it; they dam up the stream so as to make a pond, and perform the operation as skilfully as we could ourselves. They drive into the ground stakes of five or six feet long in rows, wattling each row with twigs, and puddling or filling the interstices with clay which they ram close in, so as to make the whole solid and water-tight. This dam is likewise shaped on the truest principles;* for the upper side next the water slopes, and the side below is perpendicular; the base of the dam is 10 or 12 feet thick: the top or narrow part two or three, and it is sometimes as long as 100 feet. The pond being thus formed and secured, they make their houses round the edge of it; they are cells, with vaulted roofs, and upon piles; they are made of stones, earth, and sticks; the walls are two feet thick, and plastered as neatly as if the trowel had been used. Sometimes they have two or three stories for retreating to in case of floods, and they always have two doors, one towards the water, and one towards the land. They keep their winter provisions in stores, and bring them out to use; they make their beds of moss; they live on the bark of trees, gums, and crawfish. Each house holds from twenty to thirty, and there may be from ten to twenty-five houses in all. Some of their communities are therefore larger than others, but there are seldom fewer than two or three hundred inhabitants. In working they all bear their shares: some gnaw the trees and branches with their teeth to form stakes and beams; others roll the pieces to the water; others diving make holes with their teeth to place the piles in; others collect and carry stones and clay; others beat and mix the mortar; and others carry it on their broad tails, and with these beat it and plaster it. Some superintend the rest, and make signals by sharp strokes with the tail, which are carefully attended to; the beavers hastening to the place where

* If the base is 12, and the top 3 feet thick, and the height 6 feet, the face must be the side of a right-angled triangle, whose height is 8 feet. This would be the exact proportion which there ought to be, upon mathematical principles, to give the greatest resistance possible to the water in its tendency to turn the dam round, provided the materials of which it is made were lighter than water in the proportion of 44 to 100. But the materials are probably more than twice as heavy as water, and the form of so flat a dike is taken, in all likelihood, in order to guard against a more imminent danger, —that of the dam being carried away by being shoved forwards. We cannot calculate what the proportions are which give the greatest possible resistance to this tendency, without knowing the tenacity of the materials, as well as their specific gravity. It may very probably be found that the construction is such as to secure the most completely against the two pressures at the same time.

they are wanted to work, or to repair any hole made by the water, or to defend themselves or make their escape, when attacked by an enemy.

The fitness of different animals, by their bodily structure, to the circumstances in which they are found, presents an endless subject of curious inquiry and pleasing contemplation. Thus, the *Camel* which lives in sandy deserts has broad spreading hoofs to support him on the loose soil; and an apparatus in his body by which water is kept for many days, to be used when no moisture can be had. As this would be useless in the neighbourhood of streams or wells, and as it would be equally so in the desert, where no water is to be found, there can be no doubt that it is intended to assist in journeying across the sands from one watered spot to another. There is a singular and beautiful provision made in this animal's foot, for enabling it to sustain the fatigues of journeys under the pressure of its great weight. Beside the yielding of the bones and ligaments, or bindings, which gives elasticity to the foot of the deer and other animals, there is in the camel's foot, between the horny sole and the bones, a cushion, like a ball, of soft matter, almost fluid, but in which there is a mass of threads extremely elastic, interwoven with the pulpy substance. The cushion thus easily changes its shape when pressed, yet it has such an elastic spring, that the bones of the foot press on it uninjured by the heavy body which they support, and this huge animal steps as softly as a cat.

Nor need we flee to the desert in order to witness an example of skilful structure in the foot: the *Horse's* limbs display it strikingly. The bones of the foot are not placed directly under the weight; if they were in an upright position, they would make a firm pillar, and every motion would cause a shock. They are placed slanting or oblique, and tied together by an elastic binding on their lower surfaces, so as to form springs as exact as those which we make of leather or steel for carriages. Then the flatness of the hoof which stretches out on each side, and the frog coming down in the middle between the quarters, adds greatly to the elasticity of the machine. Ignorant of this, ill-informed farriers nail the shoe too far back, fixing the quarters, and causing permanent contraction—so that the contracted hoof loses its elasticity; every step is a shock; inflammation and lameness ensue.

The *Rein-deer* inhabits a country covered with snow the greater part of the year. Observe how admirably its hoof is formed for going over that cold and light substance, without sinking in it, or being frozen. The under side is covered entirely with hair, of a warm and close texture; and the hoof, altogether, is very broad, acting exactly like the snow-shoes which men have constructed for giving them a larger space to stand on than their feet, and thus to avoid sinking. Moreover, the deer spreads the hoof as wide as possible when it touches the ground; but, as this breadth would be inconvenient in the air, by occasioning a greater resistance while he is moving along, no sooner does he lift the hoof than the two parts into which it is cloven fall together, and so lessen the surface exposed to the air, just as we may recollect the birds doing with their bodies and wings. The shape and structure of the hoof is also well adapted to scrape away the snow, and enable the animal to get at the particular kind of moss (or *lichen*) on which he feeds.

This plant, unlike others, is in its full growth during the winter season; and the rein-deer, accordingly, thrives from its abundance, notwithstanding the unfavourable effects of extreme cold upon the animal system.

There are some insects, of which the males have wings, and the females are grubs or worms. Of these, the *Glow-worm* is the most remarkable: it is the female, and the male is a fly, which would be unable to find her out, creeping, as she does, in the dark lanes, but for the shining light which she gives, to attract him.

There is a singular fish found in the Mediterranean, called the *Nautilus*, from its skill in navigation. The back of its shell resembles the hulk of a ship; on this it throws itself, with two of its feet raised in the air, and over these two spreads a thin membrane to serve for a sail, paddling itself on with the other two feet as oars.

The *Ostrich* lays and hatches her eggs in the sands; her form being ill adapted to that process, she has a natural oven furnished by the sand, and the strong heat of the sun. The *Cuckoo* is known to build no nest for herself, but to lay in the nests of other birds; but late observations show that she does not lay indiscriminately in the nests of all birds; she only chooses the nests of those which have bills of the same kind with herself, and therefore feed on the same kind of food. The *Duck*, and other birds breeding in muddy places, have a peculiar formation of the bill: it is both made so as to act like a strainer, separating the finer from the grosser parts of the liquid, and it is more furnished with nerves near the point than the bills of birds which feed on substances exposed to the light; so that it serves better to grope in the dark stream for food, being more sensitive. The bill of the *Snipe* is covered with a curious net-work of nerves for the same purpose; but a bird, (the *Toucan* or *Egg-sucker*,) which chiefly feeds on the eggs found in birds' nests, and in countries where these are very deep and dark, has the most singular provision of this kind. Its bill is very broad and long; when examined, it is completely covered with branches of nerves in all directions; so that, by groping in a deep and dark nest, it can feel its way as accurately as the finest and most delicate finger could. Almost all kinds of birds build their nests of materials found where they inhabit, or use the nests of other birds; but the *Swallow of Java* lives in rocky caverns on the sea, where there are no materials at all for the purpose of building. It is therefore so formed as to secrete in its body a kind of slime with which it makes a nest, much prized as a delicate food in eastern countries.

Plants, in many remarkable instances, are provided for by equally wonderful and skilful contrivances. There is one, the *Muscipula, Fly-trap*, or *Fly-catcher*, which has small prickles in the inside of two leaves, or half leaves, joined by a hinge; a juice or syrup is provided on their inner surface, and acts as a bait to allure flies. There are three small spines or prickles standing upright in this syrup, and upon the only part of each leaf that is sensitive to the touch. When the fly therefore settles upon this part, its touching as it were the spring of the trap occasions the leaves to shut and kill and squeeze the insect; so that its juices and the air arising from their rotting serve as food to the plant.

In the West Indies, and other hot countries, where rain sometimes does not fall for a great length of time, a kind of plant called the

Wild-pine grows upon the branches of the trees, and also on the bark of the trunk. It has hollow or bag-like leaves so formed as to make little reservoirs of water, the rain falling into them through channels which close at the top when full, to prevent it from evaporating. The seed of this useful plant has long threads, by which, when carried through the air, it catches any tree in the way, and falls on it and grows. Wherever it takes root, though on the under side of a bough, it grows straight upwards, otherwise the leaves would not hold water. It holds in one leaf from a pint to a quart; and although it must be of great use to the trees it grows on, to birds and other animals its use is even greater. Another tree, called the *Water-with*, in Jamaica, has similar uses; it is like a vine in size and shape, but growing in very parched districts, is yet so full of clear sap or water, that on cutting a piece two or three yards long, and merely holding it to the mouth, a plentiful draught is obtained. In the East there is a plant somewhat of the same kind, called the *Bejuco*, which grows near other trees and twines round them, with its end hanging downwards, but so full of juice, that on cutting it, a plentiful stream of water spouts from it; and this, not only by its touching the tree so closely must refresh it, but is a supply to animals, and to the weary herdsman on the mountains.

V. After the many instances or samples which have now been given of the nature and objects of Natural Science, we might proceed to a different field, and describe in the same way the other grand branch of Human Knowledge, that which teaches the properties or habits of *Mind* —the *intellectual faculties* of man; that is to say, the powers of his understanding, by which he perceives, imagines, remembers, and reasons;—his *moral faculties*, that is to say, the feelings and passions which influence him;—and, lastly, as a conclusion or result drawn from the whole, his *duties* both towards himself as an individual, and towards others as a member of society; which last head opens to our view the whole doctrines of *political science*, including the nature of governments, of policy, and generally of laws. But we shall abstain at present from entering at all upon this field, and shall now take up the subject, more particularly pointed at through the course of the preceding observations, and to illustrate which they have been framed, namely,—the use and importance of scientific studies.

Man is composed of two parts, body and mind, connected indeed together, but wholly different from one another. The nature of the union—the part of our outward and visible frame in which it is peculiarly formed—or whether the soul be indeed connected with any particular portion of the body, so as to reside there—are points as yet wholly hid from our knowledge, and which are likely to remain for ever concealed. But this we know, as certainly as we can know any truth, that there is such a thing as the mind; and that we have at the least as good proof of its existence, independent of the body, as we have of the existence of the body itself. Each has its uses, and each has its peculiar gratifications. The bounty of Providence has given us outward senses to be employed, and has furnished the means of gratifying them in various kinds, and in ample measure. As long as we only taste those pleasures according to the rules of prudence and of our duty,

that is, in moderation for our own sakes, and in harmlessness towards our neighbours, we fulfil rather than thwart the purposes of our being. But the same bountiful Providence has endowed us with the higher nature also—with understandings as well as with senses—with faculties that are of a more exalted nature, and admit of more refined enjoyments, than any the bodily frame can bestow; and by pursuing such gratifications rather than those of mere sense, we fulfil the highest ends of our creation, and obtain both a present and a future reward. These things are often said, but they are not therefore the less true, or the less worthy of deep attention. Let us mark their practical application to the occupations and enjoyments of all branches of society, beginning with those who form the great bulk of every community, the working classes, by what names soever their vocations may be called—professions, arts, trades, handicrafts, or common labour.

The first object of every man who has to depend upon his own exertions must needs be to provide for his daily wants. This is a high and important office; it deserves his utmost attention; it includes some of his most important duties, both to himself, his kindred, and his country; and although in performing this office he is only influenced by his own interest, or by his necessities, yet it is one which renders him truly the best benefactor of the community to which he belongs. All other pursuits must give way to this; the hours which he gives to learning must be after he has done his work; his independence, without which he is not worthy to be called a man, requires first of all that he should have ensured for himself, and those dependent on him, a comfortable subsistence before he can have a right to taste any indulgence, either of his senses or of his mind; and the more he learns—the greater progress he makes in the sciences—the more will he value that independence, and the more will he prize the industry, the habits of regular labour, whereby he is enabled to secure so prime a blessing.

In one view, it is true, the progress which he makes in science may help his ordinary exertions, the main business of every man's life. There is hardly any trade or occupation in which useful lessons may not be learnt by studying one science or another. The necessity of science to the more liberal professions is self-evident; little less manifest is the use to their members of extending their knowledge beyond the branches of study, with which their several pursuits are more peculiarly conversant. But the other departments of industry derive hardly less benefit from the same source. To how many kinds of workmen must a knowledge of *Mechanical Philosophy* prove useful! To how many others does Chemistry prove almost necessary! Every one must with a glance perceive that to engineers, watch-makers, instrument-makers, bleachers, and dyers, those sciences are most useful, if not necessary. But carpenters and masons are surely likely to do their work better for knowing how to measure, which Practical Mathematics teaches them, and how to estimate the strength of timber, of walls, and of arches, which they learn from Practical Mechanics; and they who work in various metals are certain to be the more skilful in their trades for knowing the nature of those substances, and their relations to both heat and other metals, and to the airs and liquids they

come in contact with. Nay, the farm-servant, or day-labourer, whether in his master's employ, or tending the concerns of his own cottage, must derive great practical benefit,—must be both a better servant, and a more thrifty, and therefore comfortable, cottager, for knowing something of the nature of soils and manures, which Chemistry teaches, and something of the habits of animals, and the qualities and growth of plants, which he learns from Natural History and Chemistry together. In truth, though a man be neither mechanic nor peasant, but only one having a pot to boil, he is sure to learn from science lessons which will enable him to cook his morsel better, save his fuel, and both vary his dish and improve it. The art of good and cheap cookery is intimately connected with the principles of chemical philosophy, and has received much, and will yet receive more, improvement from their application. Nor is it enough to say, that philosophers may discover all that is wanted, and may invent practical methods, which it is sufficient for the working man to learn by rote without knowing the principles. He never will work so well if he is ignorant of the principles; and for a plain reason:—if he only learn his lesson by rote, the least change of circumstances puts him out. Be the method ever so general, cases will always arise in which it must be varied in order to apply; and if the workman only knows the rule without knowing the reason, he must be at fault the moment he is required to make any new application of it. This, then, is the *first* use of learning the principles of science: it makes men more skilful, expert, and useful in the particular kinds of work by which they are to earn their bread, and by which they are to make it go far and taste well when earned.

But another use of such knowledge to handicraftsmen and common labourers is equally obvious: it gives every man a chance, according to his natural talents, of becoming an improver of the art he works at, and even a discoverer in the sciences connected with it. He is daily handling the tools and materials with which new experiments are to be made; and daily witnessing the operations of nature, whether in the motions and pressures of bodies, or in their chemical actions on each other. All opportunities of making experiments must be unimproved, all appearances must pass unobserved, if he has no knowledge of the principles; but with this knowledge he is more likely than another person to strike out something new which may be useful in art, or curious or interesting in science. Very few great discoveries have been made by chance and by ignorant persons—much fewer than is generally supposed. It is commonly told of the steam-engine that an idle boy being employed to stop and open a valve, saw that he could save himself the trouble of attending and watching it, by fixing a plug upon a part of the machine which came to the place at the proper times, in consequence of the general movement. This is possible, no doubt; though nothing very certain is known respecting the origin of the story; but improvements of any value are very seldom indeed so easily found out, and hardly another instance can be named of important discoveries so purely accidental. They are generally made by persons of competent knowledge, and who are in search of them. The improvements of the Steam-engine by Watt resulted from the most learned investi-

gation of mathematical, mechanical, and chemical truths. Arkwright devoted many years, five at the least, to his invention of Spinning jennies, and he was a man perfectly conversant in every thing that relates to the construction of machinery: he had minutely examined it, and knew the effects of each part, though he had not received any thing like a scientific education. If he had, we should in all probability have been indebted to him for scientific discoveries as well as practical improvements. The most beautiful and useful invention of late times, the Safety-lamp, was the reward of a series of philosophical experiments made by one thoroughly skilled in every branch of chemical science. The new process of Refining sugar, by which more money has been made in a shorter time, and with less risk and trouble, than was ever perhaps gained from an invention, was discovered by a most accomplished chemist,* and was the fruit of a long course of experiments, in the progress of which, known philosophical principles were constantly applied, and one or two new principles ascertained. But in so far as chance has any thing to do with discovery, surely it is worth the while of those who are constantly working in particular employments to obtain the knowledge required, because their chances are greater than other people's of so applying that knowledge as to hit upon new and useful ideas: they are always in the way of perceiving what is wanting, or what is amiss in the old methods; and they have a better chance of making the improvements. In a word, to use a common expression, they are in the way of good luck; and if they possess the requisite information, they can take advantage of it when it comes to them. This, then, is the *second* great use of learning the sciences: it enables men to make improvements in the arts, and discoveries in philosophy, which may directly benefit themselves and mankind.

Now, these are the *practical* advantages of learning; but the *third* benefit is, when rightly considered, just as practical as the other two—the pleasure derived from mere knowledge, without any view to our own bodily enjoyments; and this applies to all classes, the idle as well as the industrious, if, indeed, it be not peculiarly applicable to those who have the inestimable blessing of time at their command. Every man is by nature endowed with the power of gaining knowledge, and the taste for it: the capacity to be pleased with it forms equally a part of the natural constitution of his mind. It is his own fault, or the fault of his education, if he derives no gratification from it. There is a satisfaction in knowing what others know—in not being more ignorant than those we live with: there is a satisfaction in knowing what others do not know—in being more informed than they are. But this is quite independent of the pure pleasure of knowledge—of gratifying a curiosity implanted in us by Providence, to lead us towards the better understanding of the universe in which our lot is cast, and the nature wherewithal we are clothed. That every man is capable of being delighted with extending his information upon matters of science will be evident from a few plain considerations.

Reflect how many parts of the reading, even of persons ignorant of all sciences, refer to matters wholly unconnected with any interest or

* Edward Howard, brother of the Duke of Norfolk.

advantage to be derived from the knowledge acquired. Every one is amused with reading a story: a romance may please some, and a fairy tale may entertain others; but no benefit beyond the amusement is derived from this source: the imagination is gratified; and we willingly spend a good deal of time and a little money in this gratification, rather than in rest after fatigue, or in any other bodily indulgence. So we read a newspaper, without any view to the advantage we are to gain from learning the news, but because it interests and amuses us to know what is passing. One object, no doubt, is to become acquainted with matters relating to the welfare of the country; but we read the occurrences which do little or not at all regard the public interests, and we take a pleasure in reading them. Accidents, adventures, anecdotes, crimes, and a variety of other things amuse us, independent of the information respecting public affairs, in which we feel interested as citizens of the state, or as members of a particular body. It is of little importance to inquire how and why these things excite our attention, and wherefore the reading about them is a pleasure: the fact is certain; and it proves clearly that there is a positive enjoyment in knowing what we did not know before; and this pleasure is greatly increased when the information is such as excites our surprise, wonder, or admiration. Most persons who take delight in reading tales of ghosts, which they know to be false, and feel all the while to be silly in the extreme, are merely gratified, or rather occupied, with the strong emotions of horror excited by the momentary belief, for it can only last an instant. Such reading is a degrading waste of precious time, and has even a bad effect upon the feelings and the judgment. But true stories of horrid crimes, as murders, and pitiable misfortunes, as shipwrecks, are not much more instructive. It may be better to read these than to sit yawning and idle—much better than to sit drinking or gaming, which, when carried to the least excess, are crimes in themselves, and the fruitful parents of many more. But this is nearly as much as can be said for such vain and unprofitable reading. If it be a pleasure to gratify curiosity, to know what we were ignorant of, to have our feelings of wonder called forth, how pure a delight of this very kind does Natural Science hold out to its students? Recollect some of the extraordinary discoveries of Mechanical Philosophy. How wonderful are the laws that regulate the motions of fluids! Is there any thing in all the idle books of tales and horrors more truly astonishing than the fact, that a few pounds of water may, by mere pressure, without any machinery, by merely being placed in a particular way, produce an irresistible force? What can be more strange, than that an ounce weight should balance hundreds of pounds, by the intervention of a few bars of thin iron? Observe the extraordinary truths which Optical Science discloses. Can any thing surprise us more, than to find that the colour of white is a mixture of all others—that red, and blue, and green, and all the rest, merely by being blended in certain proportions, form what we had fancied rather to be no colour at all, than all colours together? Chemistry is not behind in its wonders. That the diamond should be made of the same material with coal; that water should be chiefly composed of an inflammable

substance; that acids should be almost all formed of different kinds of air, and that one of those acids, whose strength can dissolve almost any of the metals, should be made of the self-same ingredients with the common air we breathe; that salts should be of a metallic nature and composed, in great part, of metals, fluid like quicksilver, but lighter than water, and which, without any heating, take fire upon being exposed to the air, and, by burning, form the substance so abounding in saltpetre and in the ashes of burnt wood: these, surely, are things to excite the wonder of any reflecting mind—nay, of any one but little accustomed to reflect. And yet these are trifling when compared to the prodigies which Astronomy opens to our view: the enormous masses of the heavenly bodies; their immense distances; their countless numbers, and their motions, whose swiftness mocks the uttermost efforts of the imagination.

Akin to this pleasure of contemplating new and extraordinary truths, is the gratification of a more learned curiosity, by tracing resemblances and relations between things, which, to common apprehension, seem widely different. Mathematical science to thinking minds affords this pleasure in a high degree. It is agreeable to know that the three angles of every triangle, whatever be its size, howsoever its sides may be inclined to each other, are always of necessity, when taken together, the same in amount: that any regular kind of figure whatever, upon the one side of a right-angled triangle, is equal to the two figures of the same kind upon the two other sides, whatever be the size of the triangle: that the properties of an oval curve are extremely similar to those of a curve, which appears the least like it of any, consisting of two branches of infinite extent, with their backs turned to each other. To trace such unexpected resemblances is, indeed, the object of all philosophy; and experimental science in particular is occupied with such investigations, giving us general views, and enabling us to explain the appearances of nature, that is, to show how one appearance is connected with another. But we are now only considering the gratification derived from learning these things. It is surely a satisfaction, for instance, to know that the same thing, or motion, or whatever it is, which causes the sensation of heat, causes also fluidity, and expands bodies in all directions; that electricity, the light which is seen on the back of a cat when slightly rubbed on a frosty evening, is the very same matter with the lightning of the clouds;—that plants breathe like ourselves, but differently by day and by night;—that the air which burns in our lamps enables a balloon to mount, and causes the globules of the dust of plants to rise, float through the air, and continue their race;—in a word, is the immediate cause of vegetation. Nothing can at first view appear less like, or less likely to be caused by the same thing, than the processes of burning and of breathing,—the rust of metals and burning,—an acid and rust,—the influence of a plant on the air it grows in by night, and of an animal on the same air at any time, nay, and of a body burning in that air; and yet all these are the same operation. It is an undeniable fact, that the very same thing which makes the fire burn, makes metals rust, forms acids, and causes plants and animals to breathe;

that these operations, so unlike to common eyes, when examined by the light of science, are the same,—the rusting of metals,—the formation of acids,—the burning of inflammable bodies,—the breathing of animals,—and the growth of plants by night. To know this is a positive gratification. Is it not pleasing to find the same substance in various situations extremely unlike each other;—to meet with fixed air as the produce of burning,—of breathing,—and of vegetation;—to find that it is the choak-damp of mines,—the bad air in the grotto at Naples,—the cause of death in neglected brewers' vats,—and of the brisk and acid flavour of Seltzer and other mineral springs? Nothing can be less like than the working of a vast steam-engine, and the crawling of a fly upon the window. We find that these two operations are performed by the same means, the weight of the atmosphere, and that a sea-horse climbs the ice-hills by no other power. Can any thing be more strange to contemplate? Is there in all the fairy tales that ever were fancied any thing more calculated to arrest the attention and to occupy and to gratify the mind, than this most unexpected resemblance between things so unlike to the eyes of ordinary beholders? What more pleasing occupation than to see uncovered and bared before our eyes the very instrument and the process by which nature works? Then we raise our views to the structure of the heavens; and are again gratified with tracing accurate but most unexpected resemblances. Is it not in the highest degree interesting to find, that the power which keeps this earth in its shape, and in its path, wheeling round the sun, extends over all the other worlds that compose the universe, and gives to each its proper place and motion; that this same power keeps the moon in her path round our earth, and our earth in its path round the sun, and each planet in its path; that the same power causes the tides upon our earth, and the peculiar form of the earth itself; and that, after all, it is the same power which makes a stone fall to the ground? To learn these things, and to reflect upon them, fills the mind, and produces certain as well as pure gratification.

But if the knowledge of the doctrines unfolded by science is pleasing, so is the being able to trace the steps by which those doctrines are investigated, and their truth demonstrated: indeed you cannot be said, in any sense of the word, to have learnt them, or to know them, if you have not so studied them as to perceive how they are proved. Without this you never can expect to remember them long, or to understand them accurately; and that would of itself be reason enough for examining closely the grounds they rest on. But there is the highest gratification of all, in being able to see distinctly those grounds, so as to be satisfied that a belief in the doctrines is well founded. Hence to follow a demonstration of a grand mathematical truth—to perceive how clearly and how inevitably one step succeeds another, and how the whole steps lead to the conclusion—to observe how certainly and unerringly the reasoning goes on from things perfectly self-evident, and by the smallest addition at each step, every one being as easily taken after the one before, as the first step of all was, and yet the result being something not only far from self-evident, but so general and strange, that you can hardly believe it to be true, and are only convinced of it by going over

the whole reasoning—this operation of the understanding, to those who so exercise themselves, always affords the highest delight. The contemplation of experimental inquiries, and the examination of reasoning founded upon the facts which our experiments and observations disclose, is another fruitful source of enjoyment, and no other means can be devised for either imprinting the results upon our memory, or enabling us really to enjoy the whole pleasures of science. They who found the study of some branches dry and tedious at the first, have generally become more and more interested as they went on; each difficulty overcome gives an additional relish to the pursuit, and makes us feel, as it were, that we have by our work and labour established a right of property in the subject. Let any man pass an evening in listless idleness, or even in reading some silly tale, and compare the state of his mind when he goes to sleep or gets up next morning with its state some other day when he has passed a few hours in going through the proofs, by facts and reasoning, of some of the great doctrines in Natural Science, learning truths wholly new to him, and satisfying himself by careful examination of the grounds on which known truths rest, so as to be not only acquainted with the doctrines themselves, but able to show why he believes them, and to prove before others that they are true—he will find as great a difference as can exist in the same being; the difference between looking back upon time unprofitably wasted, and time spent in self-improvement: he will feel himself in the one case listless and dissatisfied, in the other comfortable and happy; in the one case, if he do not appear to himself humbled, at least he will not have earned any claim to his own respect; in the other case, he will enjoy a proud consciousness of having, by his own exertions, become a wiser and therefore a more exalted creature.

To pass our time in the study of the sciences, in learning what others have discovered, and in extending the bounds of human knowledge, has, in all ages, been reckoned the most dignified and happy of human occupations; and the name of Philosopher, or Lover of Wisdom, is given to those who lead such a life. But it is by no means necessary that a man should do nothing else than study known truths, and explore new, in order to earn this high title. Some of the greatest philosophers, in all ages, have been engaged in the pursuits of active life; and an assiduous devotion of the bulk of our time to the work which our condition requires, is an important duty, and indicates the possession of practical wisdom. This, however, does by no means hinder us from applying the rest of our time, beside what nature requires for meals and rest, to the study of science; and he who, in whatever station his lot may be cast, works his day's work, and improves his mind in the evening, as well as he who, placed above such necessity, prefers the refined and elevating pleasures of knowledge to the low gratification of the senses, richly deserves the name of a True Philosopher.

One of the most gratifying treats which science affords us is the knowledge of the extraordinary powers with which the human mind is endowed. No man, until he has studied philosophy, can have a just

idea of the great things for which Providence has fitted his understanding, the extraordinary disproportion which there is between his natural strength and the powers of his mind, and the force which he derives from those powers. When we survey the marvellous truths of Astronomy, we are first of all lost in the feeling of immense space, and of the comparative insignificance of this globe and its inhabitants. But there soon arises a sense of gratification and of new wonder at perceiving how so insignificant a creature has been able to reach such a knowledge of the unbounded system of the universe—to penetrate, as it were, through all space, and become familiar with the laws of nature at distances so enormous as baffle our imagination—to be able to say, not merely that the Sun has 329,630 times the quantity of matter which our globe has, Jupiter $308\frac{9}{10}$, and Saturn $93\frac{1}{2}$ times; but that a pound of lead weighs at the Sun 22 lbs. 15 ozs. 16 dwts. 8 grs. and $\frac{3}{4}$ of a grain; at Jupiter 2 lbs. 1 oz. 19 dwts. 1 gr. $\frac{2}{3}\frac{9}{3}$; and at Saturn 1 lb. 3 ozs. 8 dwts. 20 grs. $\frac{1}{11}$ part of a grain; and what is far more wonderful, to discover the laws by which the whole of this vast system is held together and maintained through countless ages in perfect security and order. It is surely no mean reward of our labour to become acquainted with the prodigious genius of those who have almost exalted the nature of man above its destined sphere; and, admitted to a fellowship with those loftier minds, to know how it comes to pass that by universal consent they hold a station apart, rising over all the Great Teachers of mankind, and spoken of reverently, as if NEWTON and LAPLACE were not the names of mortal men.

The highest of all our gratifications in the contemplations of science remains: we are raised by them to an understanding of the infinite wisdom and goodness which the Creator has displayed in all his works. Not a step can we take in any direction without perceiving the most extraordinary traces of design; and the skill every where conspicuous is calculated in so vast a proportion of instances to promote the happiness of living creatures, and especially of ourselves, that we can feel no hesitation in concluding, that if we knew the whole scheme of Providence, every part would be in harmony with a plan of absolute benevolence. Independently, however, of this most consoling inference, the delight is inexpressible of being able to follow, as it were, with our eyes, the marvellous works of the Great Architect of Nature, to trace the unbounded power and exquisite skill which are exhibited in the most minute, as well as the mightiest parts of his system. The pleasure derived from this study is unceasing, and so various, that it never tires the appetite. But it is unlike the low gratifications of sense in another respect: it elevates and refines our nature, while those hurt the health, debase the understanding, and corrupt the feelings; it teaches us to look upon all earthly objects as insignificant, and below our notice, except the pursuit of knowledge and the cultivation of virtue—that is to say, the strict performance of our duty in every relation of society; and it gives a dignity and importance to the enjoyment of life, which the frivolous and the grovelling cannot even comprehend.

Let us, then, conclude, that the pleasures of Science go hand in hand

with the solid benefits derived from it; that they tend, unlike other gratifications, not only to make our lives more agreeable, but better; and that a rational being is bound by every motive of interest and of duty, to direct his mind towards pursuits which are found to be the sure path of virtue as well as of happiness.

SOCIETY

FOR THE

DIFFUSION

OF

USEFUL KNOWLEDGE.

THE OBJECT of the Society is strictly limited to what its title imports, namely, the imparting useful information to all classes of the community, particularly to such as are unable to avail themselves of experienced teachers, or may prefer learning by themselves.

The plan proposed for the attainment of this object, is the periodical publication of Treatises, under the direction and with the sanction of a superintending Committee.

As numerous Societies already exist for the dissemination of Religious Instruction, and as it is the object of this Society to aid the progress of those branches of general knowledge which can be diffused among all classes of the community, no Treatise published with the sanction of the Committee shall contain any matter of Controversial Divinity, or interfere with the principles of revealed Religion.

1. Each Scientific Treatise will contain an Exposition of the Fundamental Principles of some Branch of Science—their proofs and illustrations—their application to practical uses, and to the explanation of facts or appearances.

2. For this purpose, the greater Divisions of Knowledge will be subdivided into Branches; and if one of these Subdivisions or Branches cannot be sufficiently taught in a single Treatise, it will be continued in a second.

3. When any part of a Subdivision is of sufficient practical importance to require being minutely pursued in its details, an extra or separate Treatise upon this part will be given, without interrupting the Series; and care will be taken, as far as possible, to publish those Treatises first that relate to subjects the knowledge of which is necessary for understanding those which follow.

4. Thus the great division of Natural Knowledge, commonly called Natural Philosophy, will be subdivided into different Branches, as, Elementary Astronomy—Mechanical Powers—Application of these to Machinery—Hydrostatics—Hydraulics—Pneumatics—Optics—Electricity—Magnetism. Separate Practical Treatises will be given on Dialling—Millwork—Optical Instruments; and Treatises on Geometry, Algebra, and Trigonometry will be published, before extending Natural Philosophy to its higher branches of Dynamics, Hydrodynamics, and Physical Astronomy,—the object being thus to furnish the means of acquiring, step by step, the whole of any department of Science, to the study of which interest or inclination may lead.

5. To each Treatise will be subjoined a reference to the works or parts of works in which the same subject is discussed more at large, with suggestions for enabling the student, who may feel so disposed, to prosecute his studies further.

6. Each Treatise will consist of about thirty-two pages Octavo, printed so as to contain the quantity of above one hundred ordinary octavo pages, with neat Engravings on Wood, and Tables. It will be sold for Sixpence; and one will appear on the 1st and 15th of each Month. Reading Societies, Mechanics' Institutions, and Education Committees, in the Country, will be furnished with supplies at a liberal abatement in price.

7. The first Treatise, being an INTRODUCTORY DISCOURSE UPON THE OBJECTS, ADVANTAGES, AND PLEASURES OF SCIENTIFIC PURSUITS, will be published on the *1st of March*, by

MESSRS. BALDWIN, CRADOCK, & JOY, LONDON.

The following are *among* the subjects which the plan of the Work embraces, and will follow each other in regular succession, though not exactly in the order here exhibited. The *extra* Treatises are thus marked *.

NATURAL PHILOSOPHY.

Elementary Astronomy.	Pneumatics.
Mechanical Powers.	Optics.
Practical Mechanics.	Electricity.
Mechanical Anatomy.	Magnetism.
Hydrostatics.	*Dialling.
Hydraulics.	*Millwork.

*Optical Instruments.
*Strength of Materials.
Plane Geometry.
Solid Geometry.
Algebra.
Algebraic Geometry.
Conic Sections.
Dynamics.
Hydrodynamics.
Physical Astronomy.
*Observatories.
*Astronomical Instruments.
*Gunnery and Fortification.
*Land Surveying.
*Navigation.
Heat—(2 *Treatises*).
*Thermometer and Pyrometer.
*Steam Engine.
Affinity.
Chemical Apparatus and Processes.
Definite Proportions.
Electro-Chemistry.
Objects of Chemistry—(4 *Treatises*).
Geology—(2 *Treatises*).
Chemical Functions of Animals.
Chemical Functions of Vegetables.
Meteorology.
*Dyeing
*Bleaching.
*Assaying.
Structure of Plants.
Functions of Plants.
Diseases of Plants.
Geography of Plants.
Arrangement of Plants.
Uses of Plants.
General Principles of Agriculture.
Agricultural Buildings and Machinery.
Management of a Farm.
Breeding of Cattle.
Fattening of Cattle.
Diseases of Cattle.
*Farriery.
*Hop-planting.
*Sheep-farming.
*Dairy-farming.
*Woods and Timber.
*Potatoes, Cottage, and Spade Husbandry.
Account of the PRINCIPIA.
——— OPTICS.
——— MECHANIQUE CELESTE.
——— NOVUM ORGANUM.
——— DE DIGNITATE ET AUGMENTIS.

INTELLECTUAL PHILOSOPHY.

Fundamental Principles of Human Knowledge.
Association of Ideas and Habit.
Signs of Thought (natural and arbitrary).
Grammar and Language.
Judgment and Reasoning.
Evidence and Belief; and the conduct of the Understanding.

ETHICAL PHILOSOPHY.

Pains and Pleasures.
Motives.
Classification of Human Actions.
Human Obligations.

POLITICAL PHILOSOPHY.

Objects of Government, and its means.
Legislative,
Judicial, and
Administrative powers.
Jurisprudence, Civil.
———, Criminal.
———, Preliminary (Police).
Political Economy.

HISTORY OF SCIENCE.

Mathematics.
Natural Philosophy.
Astronomy.
Chemistry.
Anatomy.
Metaphysics.
Ethics.
Religion.
Law.

History of Art.

Useful Arts.	Navigation.	Commerce.
Fine Arts.	War.	Manufactures.

HISTORY OF NATIONS.

Greece.	The Low Countries.	Spanish America.
Rome.	Switzerland.	Portuguese America.
England.	Italy.	British America.
Scotland.	Northern States.	Egypt.
Ireland.	Russia.	Western Asia.
France.	United America.	British India.
Germany.	West Indies.	China.
Spain and Portugal.		

History of Individuals.

Patriots.

Bruce.	Hampden.	Lord Falkland.
De Witt.	Sydney.	Washington.
William Tell.	Russell.	Paoli.

Warriors.

Black Prince.	Wolfe.	Rodney.
Gustavus Adolphus.	Abercrombie.	Nelson.
Marlborough.	Blake.	St. Vincent.
Turenne.	De Ruyter.	Duncan.

Discoverers.

Galileo.	Kepler.	Black.
Copernicus.	Newton.	Cavendish.
Bacon.	Leibnitz.	Priestley.
Tycho Brahe.	Hervey.	Lavoisier.

Self-exalted Men.

Franklin.	Rennie.	Arkwright.
Sir Christopher Wren.	Watt.	Smeaton.

Moral Philosophers.

Locke.	Berkeley.	Turgot.
Malbranche.	Grotius.	Smith.

Navigators.

Columbus.	Vasco di Gama.	Cook.
Drake.	Anson.	La Perouse.

Statesmen.

Wolsey.	Sully.	Somers.
Burleigh.	O. Cromwell.	Chatham.

The foregoing List is not to be considered as comprising every subject belonging to each class, but principally those which it is intended shall be first treated of.

The practical means for ensuring steady adherence to the object of the Society, and for most efficaciously securing a due execution of the plan proposed, with all such improvements of detail as experience may from time to time dictate, will be found in the following Rules for the establishment and continuance of the Society, under the conduct of an efficient Committee.

RULES.

I. The Society to consist of all such individuals as may be induced to contribute the sum of Ten Pounds or upwards, in one payment, or One Pound or upwards, annually.

II. Every Annual Subscription to be considered as made on the preceding 1st of January, and to fall due again on the following 1st of January, in each year.

III. Every Subscriber on having paid his Subscription for the current year, to be entitled to a copy of each Tract as soon as published, and to have the privilege of purchasing twelve, or any greater number, at a considerable reduction from the publication price, for gratuitous distribution.

IV. The business of the Society to be transacted by a Committee, not less than thirty in number, consisting, in the first instance, of the following Subscribers:—

Hon. J. ABERCROMBIE, M.P.
WM. ALLEN, Esq., F.R.S.
Rt. Hon. Lord ALTHORP, M.P.
Rt. Hon. Lord AUCKLAND.
Capt. FRANCIS BEAUFORT, R.N., F.R.S.
C. BELL, Esq., F.R.S.
H. BROUGHAM, Esq., M.P., F.R.S.
T. F. BUXTON, Esq., M.P., F.R.S.
J. CARTER, Esq., M.P.
R. OTWAY CAVE, Esq., M.P.
WM. CRAWFORD, Esq.
T. DENMAN, Esq., Common Sergeant of the City of London.
ROBERT FORSTER, Esq.
I. L. GOLDSMID, Esq.
Dr. OLINTHUS GREGORY, Royal Academy, Woolwich.
H. HALLAM, Esq., F.R.S.
Capt. BASIL HALL, R.N., F.R.S.
M. D. HILL, Esq.
ROWLAND HILL, Esq.
BELLENDEN KER, Esq.
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Dr. LUSHINGTON, D.C.L. M.P.
Sir J. MACKINTOSH, M.P., F.R.S.
Rev. EDW. MALTBY, D.D., F.R.S.
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JAMES MILL, Esq.
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J. SMITH, Esq., M.P

W. STURCH, Esq.
RT. HON. LORD SUFFIELD.
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E. CARTER, Esq., Portsmouth.
D. HOWARD, Esq., Portsmouth,
REV. DR. INMAN, Naval College, Portsmouth.
G. GRANT, Esq., Portsmouth.
REV. W. SHEPHERD, Liverpool.
REV. W. TURNER, Newcastle.
J. TYRRELL, Esq., Exeter.
JOS. REYNOLDS, Esq., Bristol.

Secretary—Mr. THOMAS COATES.
Collector—Mr. KENNELL.

V. The Committee to have the entire conduct of the affairs of the Society, and disposal of its Funds towards the attainment of the proposed object.

VI. The Committee to elect from time to time, from their own body, a Chairman, Deputy Chairman, and Treasurer.

VII. The Committee also to engage convenient Apartments, and a Secretary or Clerk, and Collector, taking security from the latter for the faithful discharge of his duty, with power to allow Salaries to them; and to engage, suspend, or discharge such officers as the Committee may think fit.

VIII. The Committee to add to their number and supply vacancies occurring in their own body, by ballot, from among the Subscribers; the person proposed being nominated and seconded at one Meeting in ordinary, and not to be ballotted for until the next following ordinary Meeting of the Committee—notice being given in the summons for such Meeting of the name of the person proposed, and by whom nominated and seconded.

IX. No person deriving any emolument directly or indirectly from the funds of the Society, shall be eligible to be a Member of the Committee.

X. The Committee shall meet the first Monday in every Month, without summons, or oftener, if necessary, upon special summons, under the direction of the Chairman, Deputy Chairman, or Treasurer.

XI. The ordinary business of the Committee to be transacted as soon as five Members shall assemble, and in the absence of the Chairman, Deputy Chairman, or Treasurer, the person who shall have first come, to preside; and such Chairman shall thereupon sign the Minutes of the preceding Meeting.

XII. On any election of Officers, ten Members at the least to be present.

XIII. The Committee to have liberty to appoint Sub-Committees from their own Members, for particular objects, with power for any three to act.

XIV. All questions to be decided by a majority of the Members actually present, the Chairman having only a casting vote in case of equality of numbers.

XV. In the event of any Member of the Committee not having attended one Meeting during the year, he shall be considered as having tendered his resignation.

XVI. For the conduct of their business, the Committee may, from time to time, make such regulations of detail as they shall deem expedient, and may alter or repeal such regulations as often as circumstances shall require, provided they be not inconsistent with these fundamental Rules.

XVII. That the Committee shall promote the establishment of Local and Provincial Committees, throughout the United Kingdom, for extending the object of the Society, and facilitating the attainment of it by every means of co-operation which may be suggested for that purpose; and that Members of such Local Committees shall have the privilege, when in town, of attending, but not voting, at Meetings of the London Committee.

XVIII. That every person who shall have gratuitously contributed a Tract, which shall have been published under the sanction of the Committee, shall immediately be considered an Honorary Member of the Society, and eligible on the Committee.

XIX. The Treasurer to receive all monies on account of the Society; and from time to time to invest the amount in Exchequer

Bills, except a competent sum for current expenses. The Treasurer to pay all demands upon the Society as often as he shall be authorised to do so by a Minute of the Committee: he shall also make up his Accounts half-yearly, and lay the same before Auditors to be nominated by the Committee; and such Accounts, when passed and verified by the Auditors, shall be signed, and the balance in hand declared by a Minute to be entered on the proceedings of the Committee. The Treasurer, however, to be at liberty to disburse sums for current expenses not exceeding 20*l.* at one time; subject, however, to be checked by the Auditors on passing each half-yearly Account.

XX. The Secretary or Clerk shall keep the Minute-books of the Committee, enter the Reports and Proceedings of all Sub-Committees, send written or printed notices to Members of the Committee to meet at the times and places fixed; and act and correspond as such Committees may direct, in furtherance of the views of the Society; and, in general, perform all the other duties which are understood to belong to the office of Secretary.

XXI. The Collector to act as Messenger, as there may be occasion; and to render such assistance in the office, from time to time, as may be required of him by the Committee, Treasurer, or Secretary; and to be paid such salary or poundage as may be agreed on, he giving security to account for all monies which may come to his hands.

XXII. No alteration to be introduced into these Rules, or any new one proposed, unless the same shall have been moved and seconded, in writing, at an ordinary Meeting, and entered on the Minutes for the purpose of being considered at the next Meeting, which shall consist of not less than ten Members; the subject being specially noticed in the summons, and not to be carried into effect until confirmed at a following Meeting.

*** All Communications to the Society; offers of literary assistance, with the Terms, &c., to be addressed to MR. COATES, the Secretary, No. 7, Furnival's Inn, Holborn; and, *if from the Country,* under cover to any of the Committee who may be in Parliament.

Orders for the Publications to be addressed to Messrs. BALDWIN & Co.

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